COLLINS

instruction book

Cedar Rapids Division | Collins Radio Company, Cedar Rapids, Iowa

32S-3 Transmitter

Collins Amateur Equipment Guarantee

The Collins Amateur Equipment described herein is sold under the following guarantee:

Collins agrees to repair or replace, without charge, any equipment, parts, or accessories which are defective as to workmanship or materials and which are returned to Collins at its factory or its designated Service Agency, transportation prepaired, provided:

(a) Buyer presents properly executed Warranty Verification Certificate.

(b) Notice of the claimed defect is given Collins or an authorized Service Agency, or an authorized Distributor, in writing, within 180 days from the date of purchase and goods are returned in accordance with Collins instructions.

(c) Equipment, accessories, tubes, and batteries not manufactured by Collins or from Collins designs are subject to only such adjustments as Collins may obtain from the supplier thereof.

(d) Any failure due to use of equipment for purposes other than those contemplated in normal amateur operations or in violation of Collins applicable Instruction Book shall not be deemed a defect within the meaning of these provisions.

This Warranty is void with respect to equipment which is altered, modified or repaired by other than Collins or Collins Authorized Service Agencies. However, alteration or modification in accordance with Collins Service Bulletins shall not affect this Warranty.

Collins reserves the right to make any change in design or to make additions to, or improvements in, Collins products without imposing any obligations upon Collins to install them in previously manufactured Collins products.

No other warranties, expressed or implied, shall be applicable to said equipment, and the foregoing shall constitute the Buyer's sole right and remedy under the agreements contained in these paragraphs. In no event shall Collins have any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of the products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

NOTICE: With each equipment or set of equipments purchased, the distributor should furnish a Warranty Verification Certificate. It is necessary that this certificate accompany the equipment when it is returned for warranty repairs. Be sure that you get it from your distributor.

Warranty Repairs

On the opposite page are listed the Service Agencies authorized to perform warranty repair on Collins Amateur Equipments.

If you should wish to return material or equipment direct to Collins under the guarantee, you should notify Collins, giving full particulars including the details listed below, insofar as applicable. If the item is thought to be defective, such notice must give full information as to nature of defect and identification (including part number if possible) of part considered defective. Upon receipt of such notice, Collins will promptly advise you respecting the return. Failure to secure our advice prior to the forwarding of the goods or failure to provide full particulars may cause unnecessary delay in handling of your returned merchandise.

ADDRESS:

Collins Radio Company
Amateur Product Office
Cedar Rapids, Iowa

INFORMATION NEEDED:

(A) Type number, name and serial number of equipment
(B) Date of delivery of equipment
(C) Date placed in service
(D) Number of hours of service
(E) Nature of trouble
(F) Cause of trouble if known
(G) Name of distributor from whom the equipment was purchased.

Equipment returned to the Service Agency or Collins for warranty repair must be accompanied with the Warranty Verification Certificate.

Out-of-warranty Repair, Modifications, Addition of Accessories, Alignment, etc.:

For information on service of this type write to the address shown below. If you wish to return your equipment for repairs, etc., without prior correspondence, be sure to include the following information attached to the equipment inside the packing carton:

(1) Complete instructions detailing work to be performed.
(2) Your return address.
(3) Method of shipment by which the equipment should be returned.
(4) Special instructions.

DIRECT YOUR CORRESPONDENCE TO:

Collins Radio Company
Product Support Division
Third Street Building
Cedar Rapids, Iowa

1 June 1964

HOW TO ORDER REPLACEMENT PARTS:

When ordering replacement parts, you should direct your order to one of the listed Collins distributors.

Please furnish the following information insofar as applicable:

INFORMATION NEEDED:

(A) Quantity required
(B) Collins part number (9 or 10 digit number) and description
(C) Item or symbol number obtained from parts list or schematic
(D) Collins type number, name and serial number of principal equipment
(E) Unit subassembly number (where applicable)

NOTE: See Distributor List.

523-0755011-003311
3rd Edition, 15 September 1964

COLLINS

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32S-3
Transmitter

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Collins Authorized Amateur Distributors and Service Agencies

ALABAMA

Ack Radio Supply Co.
3101 4th Avenue South
Birmingham 35233
Ph: 205 FA 2-0588
Attn: E. C. Atkerson/
Wm. Harmon

*Beddow Engineering Services
1501 Seventh Street SE
Decatur 35601
Ph: 205 353-6329/355-1026
Attn: Dr. C. P. Beddow

Electronic Wholesalers, Inc.
2310 Bob Wallace Ave. SW
Huntsville 35805
Ph: 205 534-2461
Attn: Joe H. Austin

Specialty Distributing Company
1276 Belt Line South Highway
Mobile 36609
Ph: 205 344-0450
Attn: Frank Stanley

ALASKA

Yukon Radio Supply, Inc.
(P.O. Box 406)
645 I Street
Anchorage 99501
Attn: A. E. Peterson

ARIZONA

Elliott Electronics, Inc.
418 N. 4th Avenue
Tucson 85705
Ph: 602 MA 4-2473
Attn: Bob Nordman

**Southwest Electronic Devices
(P.O. Box 3751)
Second Street at Madison
Phoenix 85030
Ph: 602 252-1741
Attn: Herman A. Middleton/
Clark Tatum

ARKANSAS

Moory's Wholesale Radio Co.
(P.O. Box 605)
12th & Jefferson Streets
DeWitt 72042
Ph: 501 WH 6-2820
Attn: Ed Moory

CALIFORNIA

**Amrad Electronics
999 Howard Avenue
Burlingame 94101
Ph: 415 DI 2-5757
Attn: J. Steventon

Amrad Supply, Inc.
3425 Balboa Street
San Francisco 94121
Ph: 415 SK 1-4661
Attn: David Bradley

*Communication Receiver Service
5016 Maplewood
Los Angeles 90004
Ph: 213 HO 2-2429
Attn: Charles C. Messman

Electronic City Inc.,
4001 West Burbank Blvd.,
Burbank 91505
Ph: 213 842-5275
Attn: Howard Pollyea

Elmar Electronics
140 - 11th Street at Madison
Oakland 94607
Ph: 415 TE 4-3311
Attn: Elvin Feige/M. L. Chirone/
Stan Johnson (TWX-(OA73)

**Henry Radio Inc.
931 N. Euclid
Anaheim 92801
Ph: 714 PR 2-9200
Attn: Walt Henry

**Henry Radio Co. Inc.
(P.O. Box 64398)
11240 W. Olympic Blvd.
Los Angeles 90064
Ph: 213 GR 7-6701
Attn: Ted Henry

Mission Ham Supplies
3316 Main Street
Riverside 92501
Ph: 714 OV 3-0523
Attn: William P. Hullquist

Quement Industrial Electronics
(P.O. Box 527)
1000 S. Bascom Avenue
San Jose 95128
Ph: 408 CY 4-0464
Attn: Frank Quement/Pete Phelps

Radio Products Sales, Inc.
1501 S. Hill Street
Los Angeles 90015
Ph: 213 RI 8-1271
Attn: Ken Rausin

Western Radio & TV Supply Co.
(P.O. Box 1728)
1415 India Street
San Diego 92101
Ph: 714 BE 9-0361
Attn: Art Stewart/Glen Cecil

COLORADO

**Burstein-Applebee Co. of Colorado
1237 - 16th Street
Denver 80202
Ph: 303 222-8986
Attn: Willard Wright/John Capone

CONNECTICUT

Corky's Division
Hatry of Hartford
100 High Street
Hartford 06118
Ph: 203 JA 7-1881
Attn: Edward C. Gedney

DISTRICT OF COLUMBIA

Electronic Wholesalers, Inc.
2345 Sherman Ave., NW
Washington 20001
Ph: 202 HU 3-5200
Attn: Richard E. Corbett

FLORIDA

**Amateur Electronic Supply
19 Azalea Park Shopping Center
Orlando 32807
Ph: 305 277-8281
Attn: Philip J. LaMarche

Amateur Radio Center, Inc.
2807-9 N.E. Second Avenue
Miami 33137
Ph: 305 FR 4-4101
Attn: Wiley Gilkison

**Electronic Wholesalers, Inc
9390 NW 27th Ave
Miami 33147
Ph: 305 OX 6-1620
Attn: Phil Konter/Paul Klein

**Grice Electronics, Inc.
300 East Wright Street
(P.O. Box 1911)
Pensacola 32501

Ph: 305 HE 3-4616
Attn: F.R. Grice, Jr./Virgil Wood/
Clarke Simms/Floyd Grice

**Kinkade Radio Supply, Inc.
1719 Grand Central Avenue
Tampa 33606
Ph: 813 253-6043
Attn: E.T. Kinkade

GEORGIA

Ack Radio Supply Company
554 Deering Road N W
Atlanta 30309
Ph: 404 873-5246
Attn: T.E. Atkerson

*Southeastern Engineering Service
1356 Carolyn Drvie NE
Atlanta 30329
Ph: 404 634-2249
Attn: Harvey Minsk

Southeastern Radio Parts Company
430 W. Peachtree St., NW
Atlanta
Ph: 404 524-7536
Attn: Jack D. Holland

Specialty Distributing Co., Inc.
763 Juniper NE
Atlanta 30308
Ph: 404 TR 3-2521
Attn: J.E. Eaton/Doule Hurley

HAWAII

**Honolulu Electronics
819 Keeaumoku Street
Honolulu 96814
Ph: 955-564
Attn: Thomas Teruya

ILLINOIS

Amateur Electronic Supply
6450 North Milwaukee Ave.
Chicago 60631
Ph: 312 RO 3-1030
Attn: Harold Wessels/Terry Sterman

Klaus Radio & Electric Company
403 E. Lake Street
Peoria 61614
Ph: 309 688-3401
Attn: Clifford Morris

Newark Electronics Corporation
223 W. Madison St.
Chicago 60606
Ph:. 312 ST 2-2944
Attn: Joe Sheffer/Less Wilkins/A.L. Poncher

INDIANA

Graham Electronics Supply, Inc.
122 S. Senate Avenue
Indianapolis 46225
Ph: 317 ME 4-8487
Attn: G. M. Graham/Dick Seigel/
H.H. Thompson

Radio Distributing Co., Inc.
(P.O. Box 1499)
1212 High Street
South Bend 46624
Ph: 219 AT 8-4665
Attn: William A. Davidson

IOWA

Radio Trade Supply Co.
1224 Grand Avenue
Des Moines 50309
Ph: 515 288-7237
Attn: Larry Woolis

World Radio Laboratories, Inc.
(P.O. Box 919)
3415 W. Broadway
Council Bluffs 51501
Ph: 712 328-1851
Attn: Alan McMillan/Leo Meyerson/
C. H. Williams

LOUISIANA

Crescent Electronic Supply, Inc.
537 S. Claiborne Avenue
New Orleans 70112
Ph: 504 JA 2-8726
Attn: S. L. Lemarie/Lou Vasalech

**Radio Parts, Inc.
1112 Magazine Street
New Orleans 70113
Ph: 504 522-0217
Attn: Irvine J. Levi

MARYLAND

Uncle George's Radio Ham Shack Div.
Electronic Distributors, Inc.
11324 Fern Street
Wheaton 21872
Ph: 301 LO 5-2262
Attn: Geo. J. Pasquale

MASSACHUSETTS

DeMambro Radio Supply, Inc.
1095 Commonwealth Ave.
Boston 02215
Ph: 617 AL 4-9000
Attn: Frank DeMambro/Floyd Dean

Graham Radio, Inc.
505 Main Street
Reading 01867
Ph: 617 944-4000
Attn: Robert T. Graham, Sr.

*Two-Way Radio Engineers, Inc.
1100 Tremont Street
Roxbury 01969
Ph: 617 GA 7-3511
Attn: Sherman M. Wolf/Jack Guiggey

MICHIGAN

*Communication Service Company
201 South Lincoln
Charlotte 48813
Ph: 517 543-0360
Attn: Bart Rypstra

Electronic Distributors, Inc.
1960 Peck Street
Muskegon 49440
Ph: 616 PO 6-3196
Attn: Charles W. Schecter

Purchase Radio Supply
327 E. Hoover Avenue
Ann Arbor 48103
Ph: 313 NO 8-8696
Attn: Roy J. Purchase

Radio Supply & Engineering
90 Selden Avenue
Detroit 48201
Ph: 313 TE 1-3171
Attn: Joe Keese

Warren Radio Company
1710 South Westnedge
Kalamazoo 49001
Ph: 616 FI 2-5720
Attn: P. O. Willett

MINNESOTA

Lew Bonn Company
1211 LaSalle Avenue
Minneapolis 55403
Ph: 612 FE 9-6351
Attn: Joe Hotch

**Electronic Center, Inc.
107 3rd Avenue North
Minneapolis 55404
Ph: 612 FE 8-8678
Attn: Ward Jensen

MISSISSIPPI

*Coker Radio & TV Service
724 Lawrence Road
Jackson 39206
Ph: 601 366-4076
Attn: Ray C. Coker

MISSOURI

Walter Ashe Radio Company
1125 Pine Street
St. Louis 63101
Ph: 314 CH 1-1125
Attn: Joe Novak/Bill Dubord

Burstein-Applebee Co.
1012-1014 McGee St.
Kansas City 64106
Ph: 816 BA 1-1155
Attn: R. H. Friesz/Bob Hunter
(Ham Dept. 301 E. 55th Street)

Henry Radio Company
211 North Main
Butler 64730
Ph: 816 OR 9-3127
Attn: Bob Henry/Helen DeArmond

NEW HAMPSHIRE

Evans Radio
(P.O. Box 312)
Bow Junction
Route 3A
Concord 03302
Ph: 603 CA 5-3358
Attn: Eddie Andrew

NEW JERSEY

*Communication Service Co.
456 Elm Avenue
Maple Shade 08052
Ph: 609 NO 5-0358
Attn: George A. Ryan

Federated Purchaser, Inc.
155 U. S. Rt. 22
Springfield 07081
Ph: 201 AD 2-8200
Attn: Hal Thorn

*Warner Engineering Co., Inc
239 Lorraine Ave.
Upper Montclair 07087
Ph: 201 PI 6-7900
Attn: Charles K. Atwater

NEW MEXICO

*Simms Communications Inc.
217 Camino Encantado
Santa Fe 87501
Ph: 505 YU 2-9502
Attn: Preston W. Simms

NEW YORK

Adirondack Radio Supply
(P.O. Box 88)
185-191 W. Main St.
Amsterdam 12010
Ph: 518 VI 2-8350
Attn: Ward Hinkle

*Amatronics, Inc.
91-46 Lefferts Blvd.
Richmond Hill 13144
Ph: 212 HI 1-7890
Attn: Raymond E. Morris

*Electronic Servicenter of New York
65-37 Queens Blvd.
Woodside 12789
Ph: 212 IL 7-7733
Attn: Irv Strauber

Ft. Orange Radio Distributing Co. Inc.
904-16 Broadway
Albany 12207
Ph: 518 HE 6-8411
Attn: Harry Miller/David Marks

Harrison Radio Corp.
144-24 Hillside Ave.
Jamaica, L. I. 11435
Ph: 212 RE 9-4102
Attn: Ben Snyder/Bernie Shapiro

Harrison Radio Corp.
225 Greenwich St.
New York 10007
Ph: 212 BA 7-7777
Attn: W. E. Harrison/Ben Snyder

Harvey Radio, Inc.
103 W. 43rd Street
New York 10036
Ph: 212 JU 2-1500
Attn: Harvey Sampson/George Zarri

Rite Electronics, Inc.
1946 New York Avenue
Huntington Station 11746
Ph: 516 HA 7-4330
Attn: Louis Richman

NORTH CAROLINA

Electronic Wholesalers, Inc.
938 Burke Street
Winston-Salem 27101
Ph: 919 PA 5-8711
Attn: D. Watts

**Freck Radio & Supply Co., Inc.
38 Biltmore Avenue
Asheville 28801
Ph: 704 AL 3-3631
Attn: T. T. Freck

OHIO

Custom Electronics, Inc.
1918 South Brown Street
Dayton 45409
Ph: 513 223-3157
Attn: Richard Sauer/Everett Elder

*Service Agency only
**Distributor and Service Agency

9/10/64

Pioneer Electronic Supply Co.
5403 Prospect Avenue
Cleveland 44103
Ph: 216 432-0010
Attn: Bill Piwanka/Don Hasek/
Robert Gainer

Selectronic Supplies, Inc.
3185 Bellevue Road
Toledo 43606
Ph: 419 GR 4-5477
Attn: Glenn Ingersoll/Don Schaller

**Universal Service
114 N. Third Street
Columbus 43215
Ph: 614 CA 1-2335
Attn: Francis R. Gibb/Dick Lytle

OKLAHOMA

**Radio, Inc.
1000 South Main
Tulsa 74119
Ph: 918 LU 7-9124
Attn: E. R. Durham/E. V. Gunn

OREGON

**Portland Radio Supply Co.
1234 S. W. Stark Street
Portland 97205
Ph: 503 CA 8-8647
Attn: C. B. Lucas

PENNSYLVANIA

Cameradio Company
1121 Penn Avenue
Pittsburgh 15222
Ph: 412 EX 1-4000
Attn: Edward Cooper/Roy Leisifer

Ham Buerger
Rices Mill Road at Glenside Avenue
Wyncote 19195
Ph: 215 CA 4-1740
Attn: Howard C. Buerger

Radio Electric Service Company of Pa.
N.W. Corner 7th & Arch Streets
Philadelphia 19106
Ph: 215 WA 5-5840
Attn: Edward Miller

RHODE ISLAND

W. H. Edwards Company
116 Hartford Avenue
Providence 02909
Ph: 401 GA 1-6614
Attn: Sal Infantolino

SOUTH DAKOTA

Burghardt Radio Supply
(P.O. Box 746)
621 4th Street S. E.
Watertown 57201
Ph: 605 TU 6-5749
Attn: Stan Burghardt/Al Hodgin

TENNESSEE (formerly CENTRAL)

Electra Distributing Co.
1914 West End Avenue
Nashville 37203
Ph: 615 AL 5-8444
Attn: Richard B. Harris

W. & W. Distributing Company
644-646 Madison Avenue
(P.O. Box 436)
Memphis 38101
Ph: 901 JA 7-4628
Attn: Mrs S.D. Wooten/
J. D. Grimes

TEXAS

Amateur Electronics, Inc.
2802 Ross Avenue
Dallas 75201
Ph: 214 RI 8-9871
Attn: Walter L. Jackson/Wm. Alford

**Busacker Electronic Equipment Co., Inc.
(P.O. Box 13204)
1216 West Clay Street
Houston 77019
Ph: 713 JA 6-2578
Attn: Garth L. Johnson/Bob Tracey

*Communications Service, Inc.
(P.O. Box 10373)
1601 Dragon Street
Dallas 75207
Ph: 214 RI 7-1852
Attn: Cecil A. White, Jr.

**Electronic Equipment & Engineering
Company
805 South Staples St.
Corpus Christi 78404
Ph: 512 TU 3-9271
Attn: R. N. Douglas

Electronic Equipment & Engineering Co.
2606 Westheimer
Houston 77006
Ph: 713 JA 4-2558
Attn: Jack Castleberry

**Howard Radio Company
1475 Pine Street
Abilene 79601
Ph: 915 OR 2-9501
Attn: R. L. Howard/E. J. Daigre

Radio & TV Parts
1828 North St. Mary's
San Antonio 78212
Ph: 512 CA 6-5329
Attn: Marion Chelkowski/Jerry Barry

TEXAS (formerly Southern)

McNicol, Inc.
811 North Estrella Street
El Paso 79903
Ph: 915 LO 6-2936
Attn: C. C. McNicol/D. C. McNicol

UTAH

*Dwyer's TV & Communications
5455 Knollcrest Street
Murray 84647
Ph: 801 AM 6-6158
Attn: Jack E. Dwyer

Manwill Supply Co.
2511 South State Street
Salt Lake City 84100
Ph: 801 HU 4-6114
Attn: J. Stewart Manwill

WASHINGTON

Cascade Electronic Supply
19721 Scriber Lake Road
(P.O. Box 563)
Lynnwood 98036
Ph: 206 PR 6-0194
Attn: Keith Nelson

C & G Electronics, Inc.
2600 Second Avenue
Seattle 98100
Ph: 206 MA 3-4536
Attn: Dennis Reanier

C & G Electronic Co.
2502 Jefferson Avenue
Tacoma 98402
Ph: 206 BR 2-3181
Attn: Lloyd Norberg/Dave Nodnan

**HCJ Electronics
6904 East Sprague
Spokane 99206
Ph: 509 WA 4-2343
Attn: Ralph Farano

Northwest Electronics, Inc.
East 730 First Avenue
Spokane 99202
Ph: 509 KE 4-2644
Attn: J. P. McGoldrick

WEST VIRGINIA

Mountain Electronics
(P.O. Box 106)
708 Bigley
Charleston 25321
Ph: 304 344-3411
Attn: Sam Warden

WISCONSIN

Amateur Electronic Supply
3832 West Lisbon Ave.
Milwaukee 53208
Ph: 414 WE 3-3262
Attn: Steve Potyandy/Terry Sterman

Harris Radio Corporation
289 North Main Street
Fond du Lac 54395
Ph: 414 WA 2-4670
Attn: Harris E. Sterman

Satterfield Electronics, Inc.
1900 S. Park St.
Madison 53713
Ph: 608 AL 7-4801
Attn: Roy Rosser/A. W. Satterfield

Collins Authorized Service Agencies

ALABAMA

*Beddow Engineering Services
1501 Seventh Street SE
Decatur 35601
Ph: 205 353-6329/355-1026
Attn: Dr. C. P. Beddow

ARIZONA

**Southwest Electronic Devices
(P.O. Box 3751)
Second Street at Madison
Phoenix 85030
Ph: 602 252-1741
Attn: Herman A. Middleton/
Clark Tatum

CALIFORNIA

**Amrad Electronics
999 Howard Avenue
Burlingame 94101
Ph: 415 DI 2-5757
Attn: J. Steventon

*Communication Receiver Service
5016 Maplewood
Los Angeles 90004
Ph: 213 HO 2-2429
Attn: Charles C. Messman

**Henry Radio Inc.
931 N. Euclid
Anaheim 92801
Ph: 714 PR 2-9200
Attn: Walt Henry

**Henry Radio Co., Inc.
(P.O. Box 64398)
11240 W. Olympic Blvd.
Los Angeles 90064
Ph: 213 GR 7-6701
Attn: Ted Henry

COLORADO

**Burstein-Applebee Co. of Colorado
1237 - 16th Street
Denver 80202
Ph: 303 222-8986
Attn: Willard Wright/John Capone

*Service Agency only
**Distributor and Service
Agency

FLORIDA

**Amateur Electronic Supply
19 Azalea Park Shopping Center
Orlando 32807
Ph: 305 277-8281
Attn: Philip J. LaMarche

**Electronic Wholesalers, Inc.
9390 NW 27th Avenue
Miami 33147
Ph: 305 OX 6-1620
Attn: Phil Konter/Paul Klein

**Grice Electronics, Inc.
330 East Wright Street
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Pensacola 32501
Ph: 305 HE 3-4616
Attn: F. R. Grice, Jr./Virgil Wood/
Clarke Simms/Floyd Grice

**Kinkade Radio Supply, Inc.
1719 Grand Central Avenue
Tampa 33606
Ph: 813 253-6043
Attn: E.T. Kinkade

GEORGIA

*Southeastern Engineering Service
1356 Carolyn Drive NE
Atlanta 30329
Ph: 404 634-2249
Attn: Harvey Minsk

HAWAII

**Honolulu Electronics
819 Keeaumoku Street
Honolulu 96814
Ph: 995-564
Attn: Thomas Teruya

LOUISIANA

**Radio Parts, Inc.
1112 Magazine Street
New Orleans 70113
Ph: 504 522-0217
Attn: Irvine J. Levi

MASSACHUSETTS

*Two-Way Radio Engineers, Inc.
1100 Tremont Street
Roxbury 01969
Ph: 617 GA 7-3511
Attn: Sherman M. Wolf/Jack Guiggey

MICHIGAN

*Communication Service Company
201 South Lincoln
Charlotte 48813
Ph: 517 543-0360
Attn: Bart Rypstra

MINNESOTA

**Electronic Center, Inc.
107 3rd Avenue North
Minneapolis 55404
Ph: 612 FE 8-8678
Attn: Ward Jensen

MISSISSIPPI

*Coker Radio & TV Service
724 Lawrence Road
Jackson 39206
Ph: 601 366-4076
Attn: Ray C. Coker

NEW JERSEY

*Communication Service Co.
456 Elm Avenue
Maple Shade 08052
Ph: 609 NO 5-0358
Attn: George A. Ryan

*Warner Engineering Co., Inc.
239 Lorraine Ave.
Upper Montclair 07087
Ph: 201 PI 6-7900
Attn: Charles K. Atwater

NEW MEXICO

*Simms Communications Inc.
217 Camino Encantado
Santa Fe 87501
Ph: 505 YU 2-9502
Attn: Preston W. Simms

NEW YORK

*Amatronics, Inc.
91-46 Lefferts Blvd.
Richmond Hill 13144
Ph: 212 HI 1-7890
Attn: Raymond E. Morris

*Electronic Servicenter of New York
65-37 Queens Blvd.
Woodside 12789
Ph: 212 IL 7-7733
Attn: Irv Strauber

NORTH CAROLINA

**Freck Radio & Supply Co., Inc.
38 Biltmore Avenue
Asheville 28801
Ph: 704 AL 3-3631
Attn: T. T. Freck

OHIO

**Universal Service
114 N. Third Street
Columbus 43215
Ph: 614 CA 1-2335
Attn: Francis R. Gibb/Dick Lytle

OKLAHOMA

**Radio, Inc.
1000 South Main
Tulsa 74119
Ph: 918 LU 7-9124
Attn: E. R. Durham/E. V. Gunn

OREGON

**Portland Radio Supply Co.
1234 S. W. Stark Street
Portland 97205
Ph: 503 CA 8-8647
Attn: C. B. Lucas

TEXAS

**Busacker Electronic
Equipment Co., Inc.
(P.O. Box 13204)
1216 West Clay Street
Houston 77019
Ph: 713 JA 6-2578
Attn: Garth L. Johnson/Bob Tracey

*Communications Service, Inc.
(P.O. Box 10373)
1601 Dragon Street
Dallas 75207
Ph: 214 RI 7-1852
Attn: Cecil A. White, Jr.

**Electronic Equipment &
Engineering Company
805 South Staples St.
Corpus Christi 78404
Ph: 512 TU 3-9271
Attn: R. N. Douglas

**Howard Radio Company
1475 Pine Street
Abilene 79601
Ph: 915 OR 2-9501
Attn: R. L. Howard/E. J. Daigre

UTAH

*Dwyer's TV & Communications
5455 Knollcrest Street
Murray 84647
Ph: 801 AM 6-6158
Attn: Jack E. Dwyer

WASHINGTON

**HCJ Electronics
6904 East Sprague
Spokane 99206
Ph: 509 WA 4-2343
Attn: Ralph Farano

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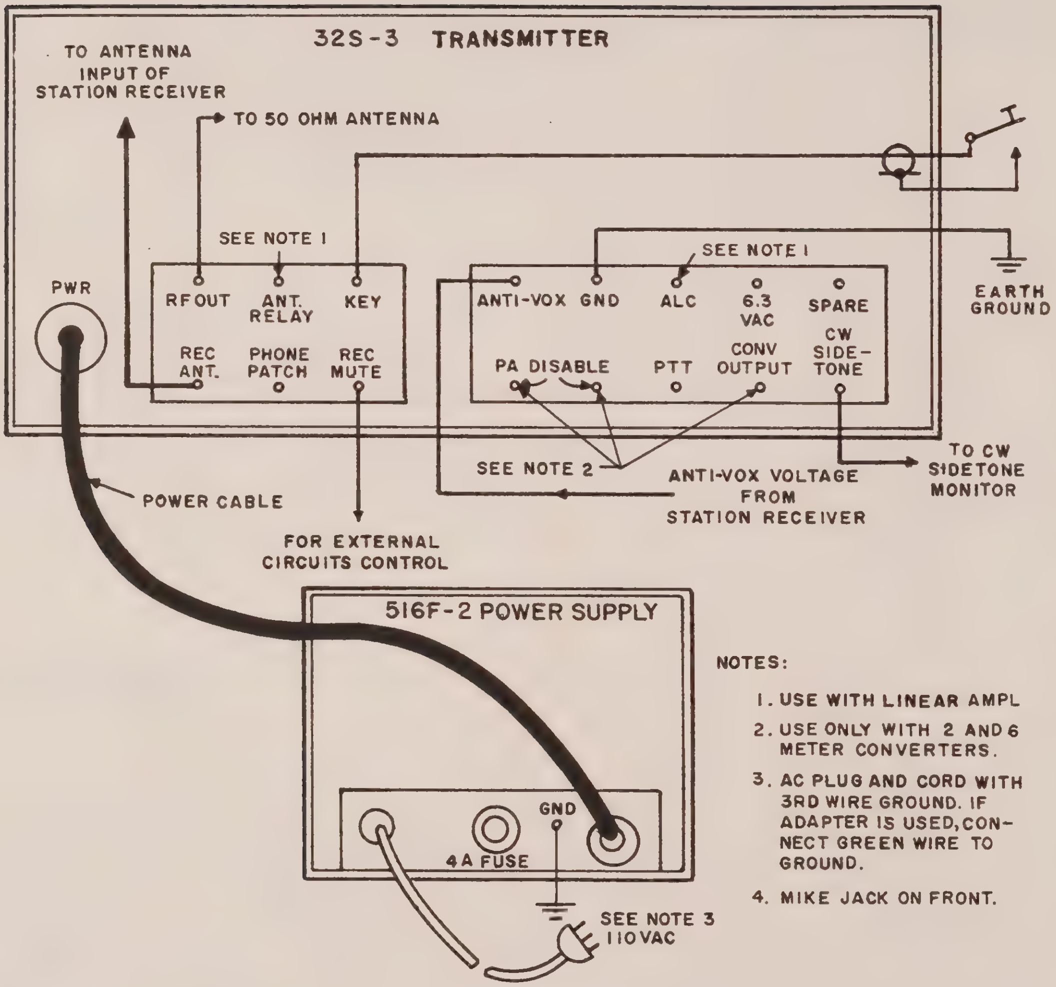


Figure 1-1. External Connections

section 1

installation

1.1 Unpacking.

Carefully lift the transmitter out of the packing material. Examine for visible damage. If transmitter has been damaged in shipment, save box and packing material, and notify the transportation company. Fill out and mail the guarantee card. Check that all tubes and crystals are properly seated in sockets. Check tuning controls and switches for freedom of action.

1.2 Mounting and Cabling.

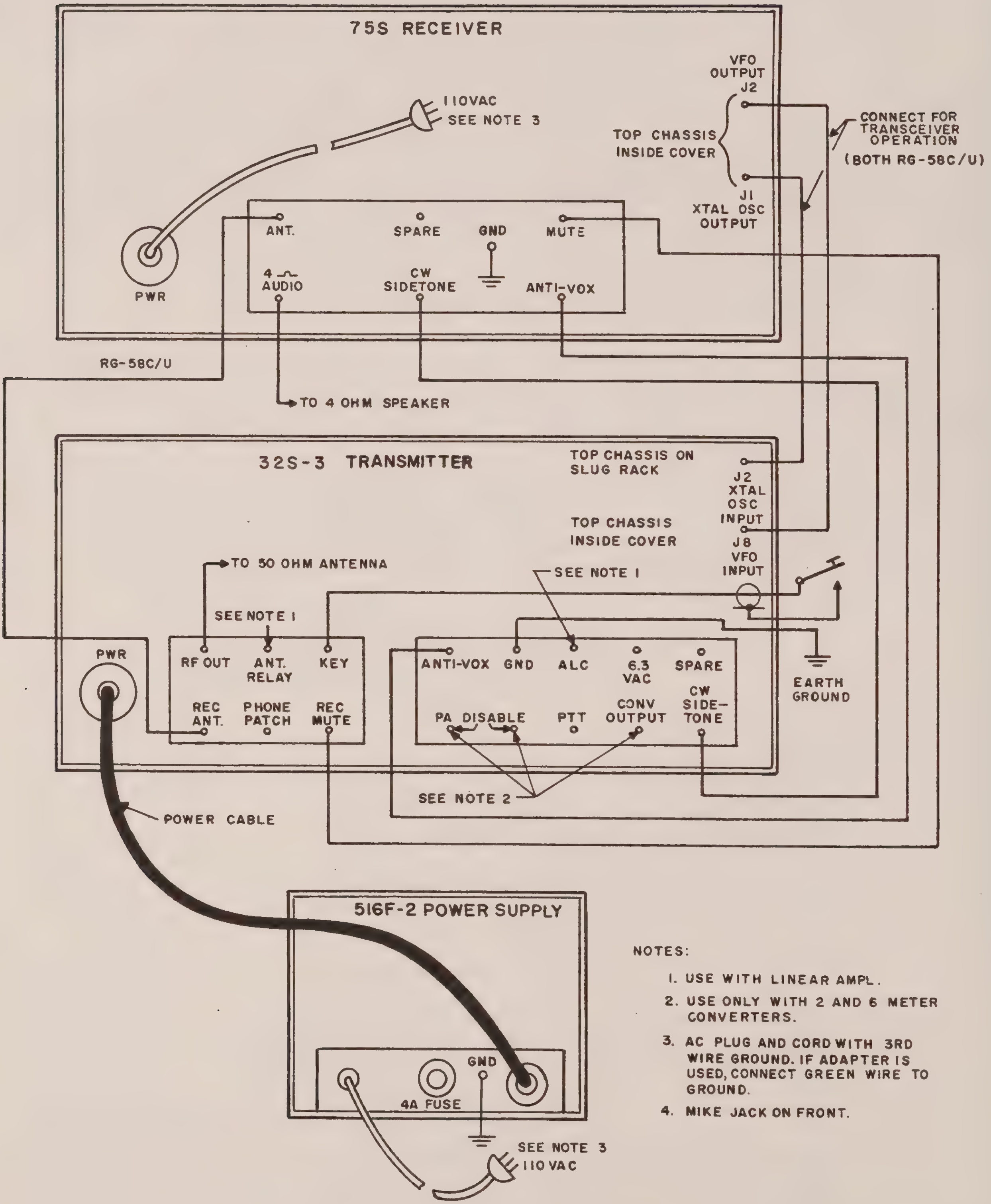
Connect transmitter to receiver, power supply, and antenna as shown in figures 1-1, 1-2, or 1-3. Using the GND lug shown in figure 1-1, connect the transmitter to a good earth ground, such as a metal water pipe or a metal stake driven deep into moist soil. The RG-58C/U cables may be identified by their slightly larger diameter and 2-inch shorter length. Use the r-f cables where shown. The smaller microphone cables are satisfactory for a-f or control functions. Connect microphone or key as shown in figure 1-1. The 32S-3 is connected for use with a high-impedance phone patch, such as the one in the 312B-4 Station Control. When using a 516F-1 Power Supply with the 32S-3, remove R114 from the power amplifier screens to ground, and connect a shorting wire across R113 in series with the screen lead.

1.3 Initial Checks.

Set MIC GAIN control full counterclockwise, FREQ CONTROL switch to TRANS VFO, EMISSION switch to USB or LSB. Open top of transmitter, and set VOX GAIN control full counterclockwise until switch S10 (PIT ON) closes. Set METER switch to P.A. PLATE position, and read the no-signal PA plate current. It should be approximately 40 ma. If plate current is other than 40 ma, adjust the BIAS ADJUST potentiometer on power supply chassis to set plate current at 40 ma. When finished, open S10 by turning VOX GAIN clockwise until switch clicks.

TABLE 1-1. EQUIPMENT FURNISHED WITH 32S-3

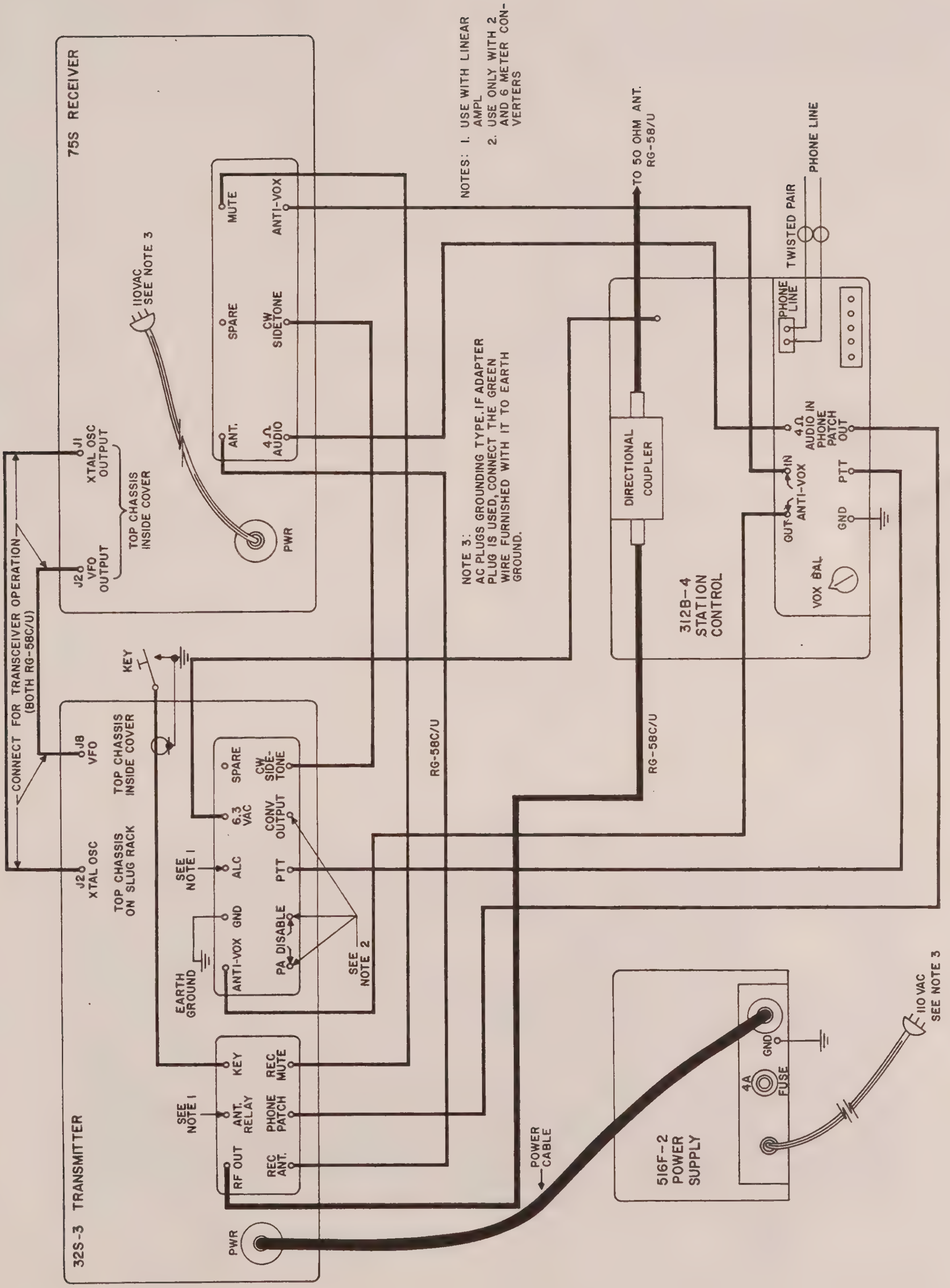
QUANTITY	DESCRIPTION	FUNCTION	COLLINS PART NUMBER
1	Log book	Station logging	523-0755-820
1	Instruction Book	32S-3 instructions	523-0755011
3	Coaxial cables with phono plug on each end, 4 feet long.	For interconnection of vfo, crystal oscillator, and antenna between 32S-3 and 75S.	426-5076-00
1	Phono plug	Antenna connector	361-0062-00
3	Shielded cables with phono plug on each end, 4 feet long	Patch cables for non-r-f circuits between 32S-3, receiver, and linear amplifier.	425-2027-00
1	Marker card	Identify cable interconnections.	280-2946-00
1	Socket head screw key #4	Accessory tool	024-2900-00
1	Socket head screw key #6	Accessory tool	024-9730-00
1	Socket head screw key #8	Accessory tool	024-0019-00
1	Socket head screw key #10	Accessory tool	024-9710-00



NOTES:

1. USE WITH LINEAR AMPL.
2. USE ONLY WITH 2 AND 6 METER CONVERTERS.
3. AC PLUG AND CORD WITH 3RD WIRE GROUND. IF ADAPTER IS USED, CONNECT GREEN WIRE TO GROUND.
4. MIKE JACK ON FRONT.

Figure 1-2. Receiver-Transmitter Interconnections



NOTES: 1. USE WITH LINEAR AMPL
2. USE ONLY WITH 2 AND 6 METER CONVERTERS

NOTE 3: AC PLUGS GROUNDING TYPE. IF ADAPTER PLUG IS USED, CONNECT THE GREEN WIRE FURNISHED WITH IT TO EARTH GROUND.

Figure 1-3. Station Interconnection for 32S-3

CAUTION

Do not set no-signal PA plate current too low; amplifier linearity will be degraded. Do not set too high; PA plate dissipation will be exceeded and tubes damaged.

NOTE

It may not be possible to reduce the no-signal PA plate current below 50 ma using some older model 516F-2 power supplies. Operation with no-signal PA plate current of 50 ma is permissible. If it is desired to increase the bias voltage output, replace R8 with a 3900-ohm 2-watt resistor, or R10 with a 6800-ohm 2-watt resistor, or both.

section 2

operation

2.1 CW Tuning.

2.1.1 TUNEUP PROCEDURE.

a. Refer to figure 2-1. Set FREQ CONTROL switch (1) to TRANS VFO.

b. Set BAND switch (11), EXCITER TUNING (2), and P. A. TUNING (4) to desired band.

c. Set tuning dial (10) to desired frequency within band. For example, if BAND switch (11) is set to 14.0 and the desired frequency is 14.195 mc, set the dial to 195. To read the frequency, add the dial setting to the BAND switch (11) setting. As an example, if the BAND switch (11) is set to 3.8 and the dial is set to 5, the frequency is 3.805 mc. If the BAND switch (11) is set to 3.8 and the dial is set to 170, the frequency is 3.970 mc.

d. Place METER switch (7) to P. A. GRID position and EMISSION switch (9) to TUNE.

e. Set MIC GAIN (12) to 3/4 full scale (3:00 o'clock), and adjust EXCITER TUNING (2) for grid current indication. Adjust both MIC GAIN (12) and EXCITER TUNING (2) controls until the grid current peaks sharply (less than full-scale indication).

f. Set METER switch (7) to P. A. PLATE position, and adjust P. A. TUNING (4) for minimum plate current.

g. Place the METER switch (7) to P. A. GRID position and EMISSION switch (9) to LOCK KEY position. Advance the MIC GAIN (12) slowly until approximately 1/2 scale grid current is indicated. Place the METER switch (7) to P. A. PLATE position, and adjust INCREASE LOADING control (5) and P. A. TUNING control (4) until the power amplifier loads to 230 ma at the plate dip. Set the METER switch to the P. A. GRID position, and repeak the exciter tuning for a P. A. grid current peak. Reduce the MIC GAIN control as necessary.

h. Set EMISSION switch (9) to CW. Open top cover, and set VOX GAIN control full counterclockwise until switch S10 closes. This actuates the PTT (push-to-talk) line. While sending a series of dots, adjust the MIC GAIN control (12) to obtain a grid current indication of 1 to 2 db on the meter (6). (Be sure METER switch (7) is in P. A. GRID position.) Open S10 by turning VOX GAIN control clockwise until switch clicks.

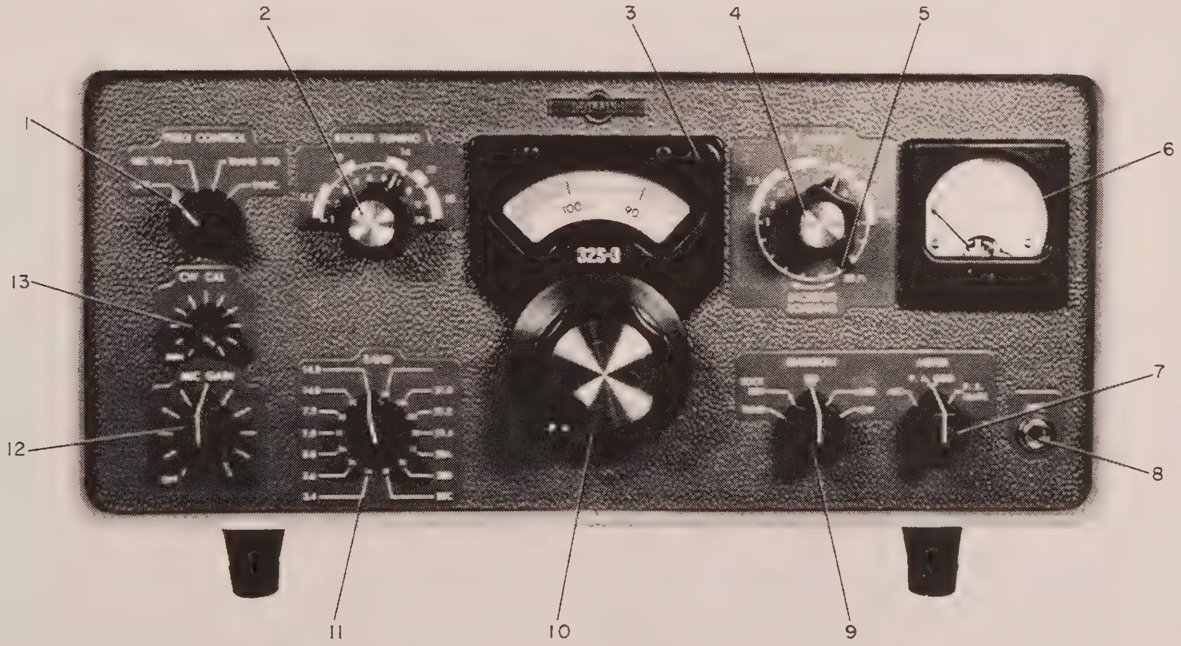


Figure 2-1. Panel Controls

2.1.2 BREAK-IN OPERATION.

a. Open the top cover, and turn the VOX GAIN control clockwise until the vox relay operates with the key. If it is desired to change the relay hold time, adjust the VOX TIME CONST control, R86. Clockwise rotation of this control increases the hold time. This control is located on a bracket under the top cover.

b. For rapid, nonbreak-in CW, connect an external switch or foot switch to PTT jack J4.

2.1.3 ADJUSTMENT OF KEYING WAVE SHAPE.

The keying wave shape control is located inside the top cover and is a screwdriver adjustment. In the extreme clockwise position, the keying shape rise and decay times are maximum, and the emitted wave will be "soft" sounding. In the extreme counterclockwise position, the keying time constant is minimum, and the omitted wave will be sharp or "hard" sounding. The correct operating position of the keying wave shape control will be somewhere between these extremes and can be adjusted to suit the operator. Undesirable key clicks may result if the 32S-3 is operated with the keying wave shape control in the extreme counterclockwise position.

2.1.4 FREQUENCY SPOTTING.

If the 32S-3 is connected with a 75S-( ) Receiver, as shown in figure 1-2, and it is desired to zero beat the 32S-3 to a frequency tuned on the receiver, gently push in on the shaft in the center of the CW CAL knob (13) while rocking the tuning dial (10) across the receiver frequency. A signal will be heard as the 32S-3 CW CAL signal passes across the receiver frequency. Zero beat this signal by manipulating the 32S-3 tuning dial (10). The level of the CW CAL signal is adjustable with the CW CAL knob (13). Maximum output is obtained with the control rotated fully clockwise.

NOTE

The 32S-3 must be tuned up for proper CW operation if the CW CAL function is to perform effectively.

2.1.5 SIDETONE OUTPUT ADJUSTMENT.

The tone oscillator output is fed to SIDETONE jack J19 when the key is closed. The SIDETONE ADJUST is a screwdriver control located under the top cover on a standoff bracket to the right of the vfo. With the 75S and 32S-3 connected as shown in figure 1-2 and the 75S audio gain control set in the desired position for CW operation, key the 32S-3, and adjust the SIDETONE ADJUST control for the desired level at the receiver audio output.

CAUTION

If the 32S-3 is to be operated in key-down continuous exciter service, limit plate loading to 200 ma.

2.1.6 OPERATION WITH 62S-1 VHF CONVERTER, 30S-1, AND 30L-1 LINEAR AMPLIFIERS.

If the antenna into which the 32S-3 is initially loaded is reactive and does not represent a 50-ohm resistive load to the transmitter, slight retouching of the P. A. TUNING may be necessary when operation with a linear amplifier is begun.

Keying characteristics may be somewhat modified due to the linear amplifier characteristics. The keying wave shape control setting can be changed to obtain the desired transmitted signal. The keying characteristics are also somewhat dependent upon drive level to the amplifier. To obtain the proper drive level, place the METER switch (7) in the ALC position. While sending a series of dots, adjust the MIC GAIN control (12) for a 1- to 2-db reading on the meter (6). Be sure that the 32S-3 ALC jack, J15, is patched to the ALC jack on the 62S-1, 30S-1, or 30L-1, whichever unit is being used.

2.2 SSB Tuning Procedure.

2.2.1 TUNEUP.

a. Perform steps a. through g. in paragraph 2.1.1. Plug a high-impedance microphone into MIC jack J1 (8).

b. Set EMISSION switch (9) to the desired sideband (USB or LSB).

c. Set METER switch (7) to ALC.

d. Actuate the PTT line in one of the following ways: Close the PTT switch on the microphone, short the PTT jack J4, rotate VOX GAIN control under the top cover fully counterclockwise to the PTT position, or (if using a 312B-4 station control) place the 312B-4 FUNCTION switch to the TRANSMIT ONLY position.

e. While talking into the microphone, advance the MIC GAIN control (12) until the meter (6) indicates about 6 db average (lower scale). Peaks may be much higher.

f. Open PTT line. If the vox relays do not drop out as fast as desired, turn VOX TIME CONST control (under the top cover) counterclockwise until they do. Make sure the VOX GAIN control is turned clockwise until the switch just clicks open. The transmitter is now ready for PTT operation.

2.2.2 VOX OPERATION.

a. Talk steadily into the microphone, and advance the VOX GAIN control (under top cover) until the vox relay operates. If the vox circuits transfer between words, increase the hold time by turning the VOX TIME CONST control (under the top cover) clockwise.

If the time constant momentarily drops out while talking, increase the VOX GAIN control.

b. To adjust anti-vox, set receiver a-f gain for normal audio level with receiver tuned to signal. If loudspeaker output causes transmitter vox circuits to operate, advance the ANTI VOX GAIN control (under top cover) in clockwise direction, and set to a level just above the point at which the receiver loudspeaker output no longer keys the transmitter vox circuits into operation. It may be necessary to increase vox gain slightly after the anti-vox gain is set.

2.2.3 SSB ZERO BEAT.

a. Transmitter and receiver should be connected as shown in figure 1-2.

b. Place transmitter FREQ CONTROL switch (1) in SYNC. position. Set both transmitter and receiver to the same sideband.

c. Slowly tune the transmitter vfo until the beat note sounds like a canary chirping. When the frequency of chirps is two or three per second, the transmitter is zero beat with the receiver within two or three cycles per second. This is a fine tuning adjustment and must be done slowly and carefully. If the microphone in use is very sensitive and omnidirectional, turn down the receiver a-f gain control to eliminate the extraneous beat notes which may appear near the zero frequency. The desired chirp will be higher pitched. When the transmitter is tuned to the exact frequency of the receiver and the two frequencies are at zero phase difference, there will be no output.

d. Set the zero set knob (3) on the 32S-3 so that the hairline indicates the same frequency as that of the receiver.

e. Switch the transmitter FREQ CONTROL (1) to TRANS VFO. The transmitter and receiver are now set for operation on the same frequency.

NOTE

The CW CAL function works only on CW and will not work on sideband.

2.2.4 OPERATION WITH LINEAR AMPLIFIER OTHER THAN 30S-1 OR 30L-1.

a. Perform paragraph 1.3, and set bias to produce 50-ma no-signal plate current.

b. Load for a plate current of 200 ma when performing tuneup.

c. If linear amplifier requires less than 80-100 watts PEP drive, use a power attenuator to reduce output level to that required by the linear amplifier.

d. Refer to paragraph 2.1.6.

2.3 Operation as Transceiver with 75S-3 Receiver.

a. Connect the 32S-3 and 75S-3/3A as shown in figure 1-2 or 1-3.

b. Remove P1 from XMTR XTAL OSC jack J7 (under top cover), and plug it into RCVR XTAL OSC jack J6. Remove the 100-ohm dummy load plug from the 75S XTAL OSC OUTPUT jack, and plug it into 32S-3 XMTR XTAL OSC jack J7.

c. Set FREQ CONTROL (1) on 32S-3 to REC VFO position.

d. Set OFF-STBY-OPR-CAL switch on 75S to STBY position.

e. Set both BAND selectors to the same desired band and both EMISSION switches to the same position (either USB, LSB or CW).

f. Tune both receiver and transmitter as in normal operation. Both transmit and receive functions operate from the receiver vfo, and the transmitter vfo is not used. Switching the transmitter FREQ CONTROL (1) back to TRANS VFO position will allow separate operation of the two units within the same 200-kc band.

NOTE

In CW transceiver operation, the 75S variable bfo will have to be used to obtain the desired beat note if it is desired to transmit zero beat with another station.

CAUTION

When operating in transceiver service, do not operate the transmitter while the receiver is tuned outside band limits; the transmitted signal will be out of the band. Do not attempt operation with receiver and transmitter set on different 200-kc bands, even when operating in TRANS VFO position. With patch cables connected for transceiver operation, the receiver h-f crystal oscillator controls injection frequency to the transmitter second mixer.

If operation on different 200-kc bands is desired, remove the transceiver patch cables. Use reverse of procedure outlined in paragraphs a and b above.

If transmitted frequency is changed by any great amount, be sure to redip the PA plate current and check the loading. This will be most important on the 80 and 40 meter bands. Some operating experience will indicate the amount of frequency excursion possible without readjustment.

Do not attempt operation in transceiver service with any other receiver not having the same frequency mixing scheme.

g. To restore both units to normal operation, remove the two patch cables connecting oscillator signals, replace P1 in J7 on the transmitter slug rack (under top cover), and replace the 100-ohm load plug in the receiver XTAL OSC OUTPUT jack.

2.4 Operation Outside Amateur Bands.

All amateur bands are completely covered except the 10-meter band for which one crystal is furnished (for 28.5 to 28.7 mc). Two extra sockets are provided for additional crystals in this band.

The transmitter can be operated at other frequencies outside the specified amateur bands (MARS

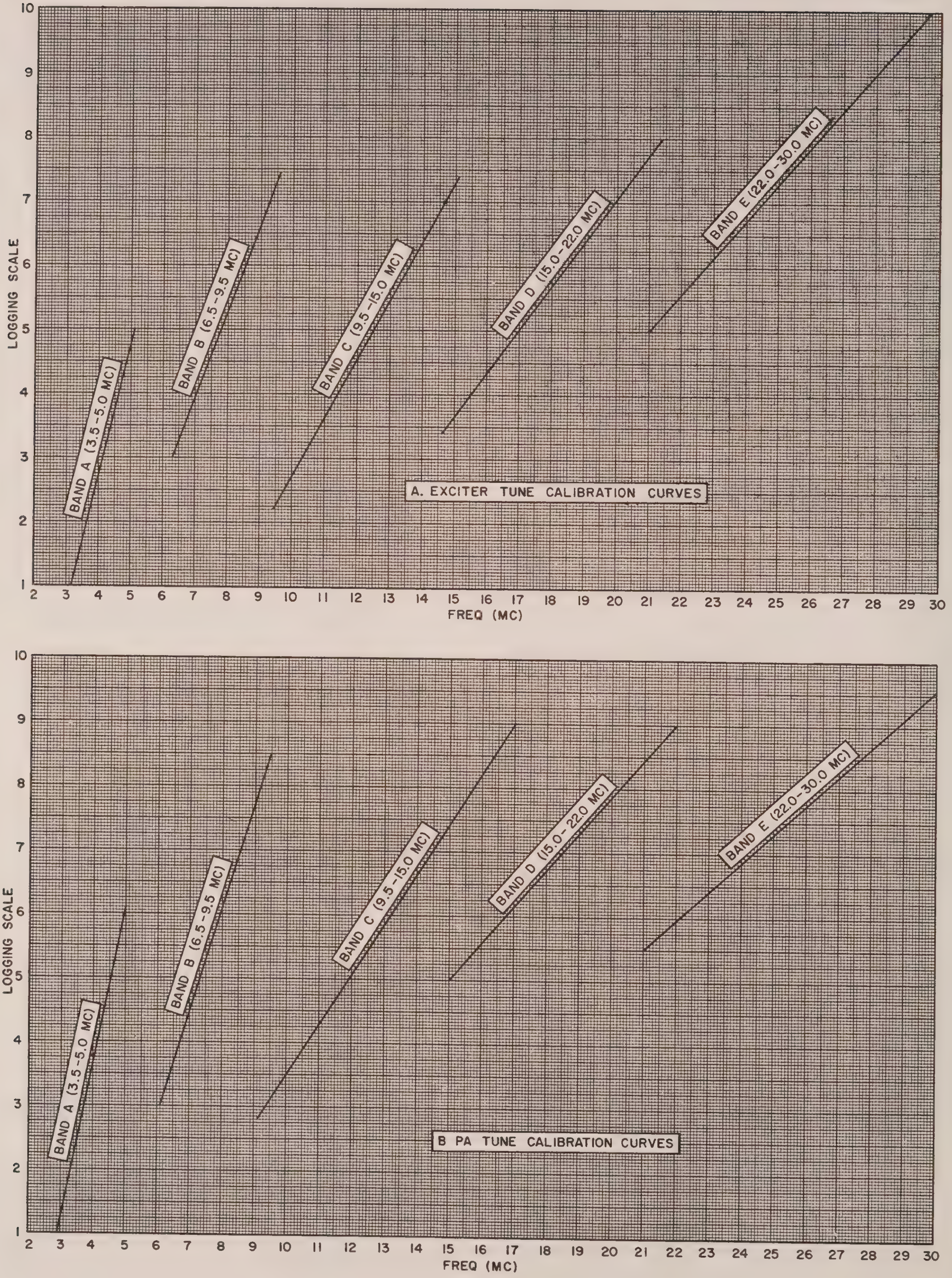


Figure 2-2. Calibration Curves

frequencies) or at other 10-meter frequencies by plugging the proper crystals into the mounting board. Figure 2-2 shows calibration curves, and figure 2-3 shows crystal socket locations. Select these crystals as follows.

CAUTION

> Avoid operation between 5.0 mc and 6.5 mc. In this range, the second harmonic of the variable i-f frequency is nearly the same as desired frequency. Some of this energy will pass through the tuned circuits and become spurious emission.

a. If the lower edge of the desired 200-kc band is less than 11.80 mc, the required crystal frequency is equal to the lower edge of the desired band plus 3.155 mc. As an example, if the desired band is 4.0 to 4.2 mc, 4.0 mc plus 3.155 mc equals 7.155 mc.

b. If the lower edge of the desired 200-kc band is 12.000 mc or higher, the required crystal frequency is half the sum of the lower desired band edge and 3.155 mc. As an example, if the desired band is 14.4 mc to 14.6 mc,

$$\frac{14.4 + 3.155}{2} = 8.7775 \text{ mc}$$

The plate circuit of the oscillator is tuned to twice the crystal frequency when required injection frequencies are this high.

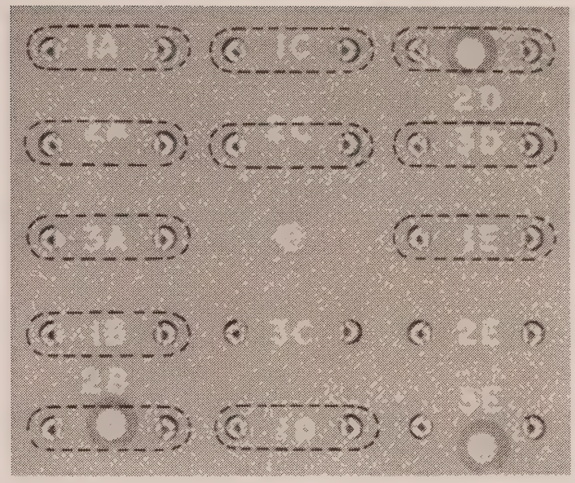


Figure 2-3. Crystal Socket Locations

c. Substitute or extra crystals should be plugged into the appropriate socket on the mounting board according to the best location in one of the five bands. By referring to the exciter tune calibration curves in figure 2-2, select the band letter corresponding to the desired operating frequency and place the required crystal in a crystal socket bearing the same band letter. The example cited in step b above should place the crystal in one of the sockets marked C. If additional 10-meter crystals are used, they should be plugged into the sockets marked E. Table 2-1 lists crystal socket designations, switch positions (BAND), crystal frequencies furnished, and frequency

TABLE 2-1. CRYSTAL FREQUENCIES AND OPERATING BANDS

BAND SWITCH POSITION	FREQUENCY BAND	CRYSTAL SUPPLIED	CRYSTAL SOCKET CONNECTED	TOTAL COVERAGE
1A - 3.4	3.4 - 3.6 mc	6.555 mc	1A	A 3.4 - 5.0 mc
2A - 3.6	3.6 - 3.8 mc	6.755 mc	2A	
3A - 3.8	3.8 - 4.0 mc	6.955 mc	3A	
1B - 7.0	7.0 - 7.2 mc	10.155 mc	1B	B 6.5 - 9.5 mc
2B - 7.2	7.2 - 7.4 mc	10.355 mc	2B	
1C - 14.0	14.0 - 14.2 mc	8.5775 mc	1C	C 9.5 - 15.0 mc
2C - 14.2	14.2 - 14.4 mc	8.6775 mc	2C	
Blank	As selected	Not furnished	3C	
1D - 21.0	21.0 - 21.2 mc	12.0775 mc	1D	D 15.0 - 22.0 mc
2D - 21.2	21.2 - 21.4 mc	12.1775 mc	2D	
3D - 21.4	21.4 - 21.6 mc	12.2775 mc	3D	
1E - 28A	28.5 - 28.7 mc	15.8275 mc	1E	E 22.0 - 30.0 mc
2E - 28B	As selected	Not furnished	2E	
3E - 28C	As selected	Not furnished	3E	

range limitations. For extra coverage crystals available, see section 6, Parts List.

2.5 Operation with 75A-4.

Mute 75A-4 by connecting REC MUTE on 32S-3 to pins 1 and 2 on E-3 terminal board on rear of 75A-4 (connect braid to pin 1 and center wire to pin 2). Operate with 75A-4 in standby condition. Feed 75A-4 500-ohm audio to ANTI-VOX input on 32S-3. Calibrate or zero beat using SYNC. position of FREQ CONTROL switch same as with 75S receivers.

2.6 Operation with 75A-4 and 312B-4.

Connect and operate same as paragraph 2.5 (above) except feed 500-ohm audio from 75A-4 to ANTI-VOX jack on 312B-4. Also feed 4-ohm audio to 312B-4.

section 3

principles of operation

3.1 Block Diagram.

Refer to figure 3-1. The type 32S-3 is a 175-watt amateur transmitter covering the 80-, 40-, 20-, 15- and 10-meter bands. The transmitter uses filter type sideband generation and heterodyne exciter principles. A crystal-controlled bfo, crystal-controlled high-frequency oscillator, and highly stable vfo form a double conversion circuit. The low-frequency i-f is 455 kc, and the high-frequency i-f is a 200-kc wide band-pass circuit. The 32S-3 may be connected in transceiver service with 75S-( ) receivers. Figure 7-1 is a schematic diagram of the 32S-3.

3.2 A-F Circuits.

Microphone or phone patch input is connected to the grid of first audio amplifier V1A, amplified, and coupled to the grid of the second audio amplifier, V1B. Output from V1B is coupled to the grid of cathode follower V2A across MIC GAIN control. Output from the cathode follower is fed to the balanced modulator. In TUNE, LOCK KEY, and CW positions of the EMISSION switch, output from the tone oscillator, V11B, is fed to the grid of the second audio amplifier. Amplifier tone oscillator signal is taken from the plate of V1B to the grid of the vox amplifier and the CW sidetone jack, J19.

3.3 Balanced Modulator and Low-Frequency I-F Circuits.

Audio output from the cathode of V2A is fed to the junction of CR3 and CR4. In USB and LSB positions of the EMISSION switch, the bfo voltage is fed to the junction of C187A and C187B. In TUNE, LOCK KEY, and CW positions of the EMISSION switch, the bfo voltage bypasses the balanced modulator, i-f amplifier, and mechanical filter and is fed directly to one of the first mixer cathodes. An output from the balanced modulator consisting of both upper and lower sidebands is coupled through i-f transformer T2 to the grid of the i-f amplifier, V3. Output from the i-f amplifier, V3, is fed to the mechanical filter, FL1. The passband of FL1 is centered at 455 kilocycles.

This passes either upper or lower sideband, depending upon the sideband polarity selected when the EMISSION switch connects bfo crystal Y12 or Y13. The single-sideband output of FL1 is connected to the grids of the first balanced mixer in push-pull.

3.4 Balanced Mixers.

The 455-kc single-sideband signal is fed to the first balanced mixer grids in push-pull, the plates are connected in push-pull, and the vfo signal is fed to the grids in parallel. The mixer cancels the vfo signal energy and translates the 455-kc single-sideband signal to a 2.955- to 3.155-mc single-sideband carrier signal. This signal is the band-pass i-f frequency. The coupling network between the plate of the first mixer and the grid of the second balanced mixer is broadbanded to provide a uniform response to the band-pass i-f frequency. The band-pass i-f signal is fed to one of the grids of the second balanced mixer, and the high-frequency injection signal from the crystal oscillator V12 is fed to the signal input cathode and to the other grid. This arrangement cancels the high-frequency injection signal energy within the mixer and translates the band-pass i-f signal to the desired operating band.

3.5 R-F Circuits.

The slug-tuned circuits coupling V5 to V6, V6 to V7, and V7 to the power amplifier are ganged to the EXCITER TUNING control. The signal is amplified by the r-f amplifier, V6, and the driver, V7, to drive the power amplifier, V8 and V9. Output from the parallel power amplifiers is tuned by a pi-network and applied to the antenna through contacts of transmit-receive relay K2. Negative r-f feedback from the PA plate circuit to the driver cathode circuit permits a high degree of linearity at the high-power level of the PA tubes. Both the driver and PA stages are neutralized to ensure their stability.

3.6 Control Circuits.

3.6.1 ALC CIRCUIT.

Detected audio from the power amplifier grid circuit is rectified by CR5 and CR6, and the negative d-c output is fed to the alc bus. A fast-attack slow-release dual time constant is used to prevent over-driving on initial syllables and to hold gain constant between words. The fast time constant alc is applied to V6, and the slow time constant alc is applied to V3. If the companion 30S-1 or 30L-1 Power Amplifier is used with the 32S-3, alc output from the 30S-1 or 30L-1 is fed back to the alc bus.

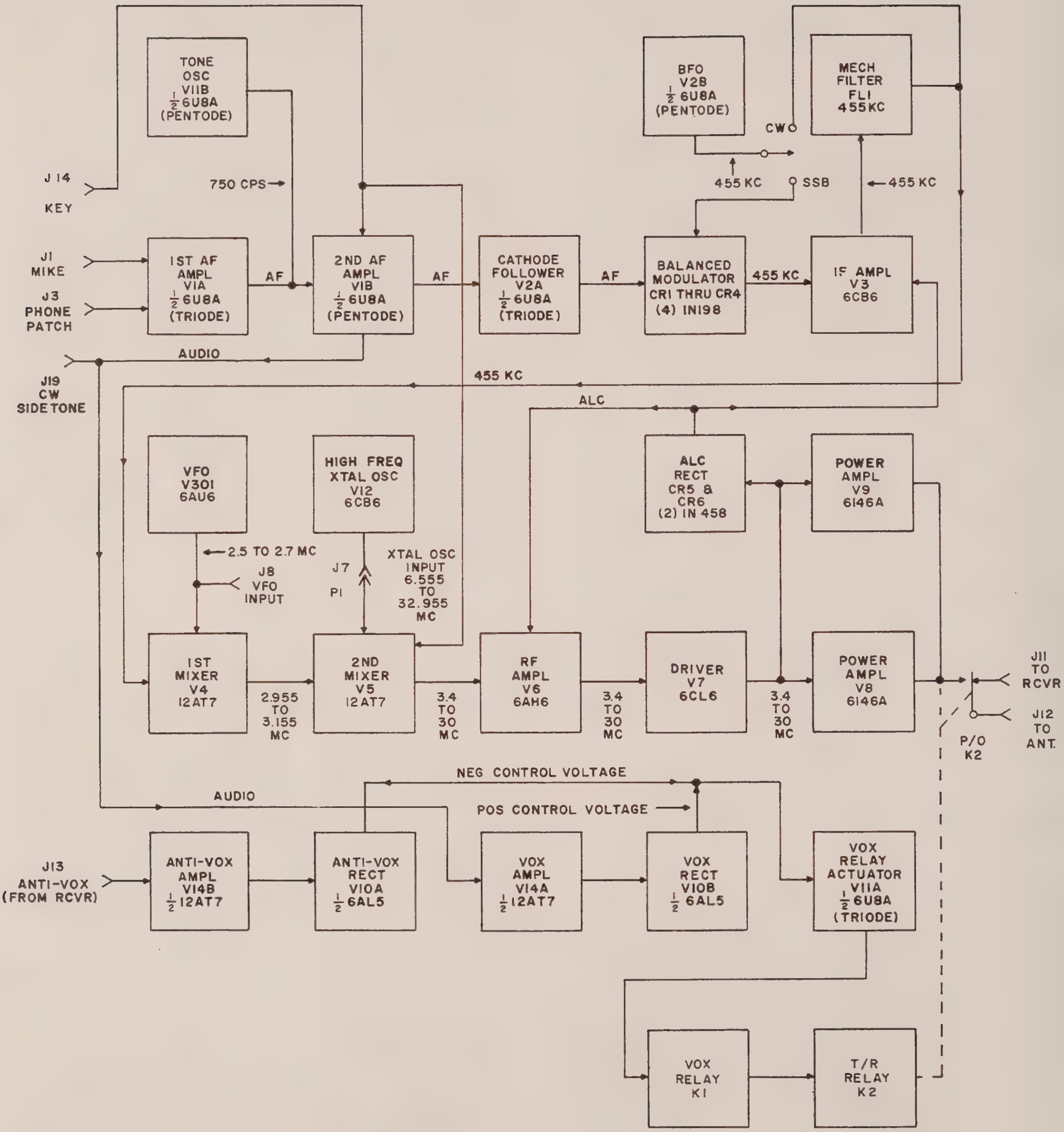


Figure 3-1. Block Diagram

3.6.2 VOX ANTI-VOX CIRCUITS.

Output from the second audio amplifier, V1B, is fed to the grid of the vox amplifier, V14A, through the VOX GAIN control, R74. This audio input is amplified by V14A and rectified by vox rectifier V10B. When the positive output of V10B is high enough to overcome the negative bias on V11A grid, the vox relay is actuated to turn the transmitter on. Receiver output is fed from J13 through the ANTI VOX GAIN control, R85, to the grid of anti-vox amplifier V14B. Output from V14B is rectified by anti-vox rectifier V10A to provide the negative bias necessary to keep the transmitter disabled during receive periods. The anti-vox circuit provides a threshold voltage to prevent loudspeaker output (picked up by the microphone circuits) from tripping the vox circuits into transmit. ANTI VOX GAIN control R85 adjusts the value of the anti-vox threshold so that loudspeaker output will not produce enough positive d-c output from the vox rectifier to exceed the negative d-c output from the anti-vox rectifier and cause V11A to actuate vox relay K1. Speech energy into the microphone will cause the positive vox voltage to overcome the negative anti-vox voltage and produce the desired action of K1. Contacts of relay K1 control relay K2, key line, PA and driver screens, receiver muting circuits, oscillator plate voltages, and the high-voltage relay in the d-c supply.

3.6.3 MANUAL GAIN CONTROL.

The MIC GAIN control is a dual potentiometer. Section R8A controls microphone gain during SSB operation. Section R8B is a cathode potentiometer which controls the gain of r-f amplifier V6 during CW operation.

3.7 Oscillators.

3.7.1 TONE OSCILLATOR.

The tone oscillator is used for vox circuit actuation and sidetone generation during CW operation. It consists of an RC phase-shift oscillator operating at approximately 750 cps. Its output is amplified by the second audio amplifier which then supplies the sidetone output and also activates the vox circuitry to provide CW break-in. In TUNE and LOCK KEY, the oscillator is used in conjunction with the second audio amplifier to give sidetone output. The oscillator is turned on when the EMISSION switch section S8C is in TUNE, LOCK KEY, or CW position.

3.7.2 BEAT-FREQUENCY OSCILLATOR.

The bfo is crystal controlled at either 453.650 kc or 456.350 kc, depending upon whether Y12 or Y13 is selected by EMISSION switch section S8F. These crystal frequencies are matched to the passband of the mechanical filter, FL1, so the carrier frequency is placed approximately 20 db down on the skirts of the filter response. This 20-db carrier suppression is in addition to the 30-db suppression provided by the balanced modulator.

3.7.3 VARIABLE-FREQUENCY OSCILLATOR.

The vfo uses fixed capacitors, a permeability-tuned variable inductor, and fixed inductors to provide the tuning range of 2.5 to 2.7 mc. The frequency-determining network is composed of capacitors C301, C302, C303, and C305, and inductors L301, L302, and L303. Capacitor C303 is paralleled by trimmer capacitor C308 and diode CR301 connected in series. A d-c bias voltage is applied to the diode through an r-f isolation resistor, R303. When LSB emission is selected, negative bias is applied to CR301 which switches C308 out of the circuit. Selection of USB emission applies positive bias to CR301, and causes it to conduct which switches C308 into the circuit. Proper adjustment of C308 shifts the vfo output frequency by an amount equal to the frequency separation of the two bfo crystals. This allows selection of either sideband without changing the suppressed-carrier frequency of the exciter r-f output.

3.7.4 HIGH-FREQUENCY CRYSTAL OSCILLATOR.

The high-frequency crystal oscillator, V12, is crystal controlled by one of 13 crystals selected by BAND switch S11. Output from the high-frequency crystal oscillator is fed to the second mixer. This frequency is always 3.155 mc higher than the lower edge of the desired transmit band. This high-frequency injection signal is crystal fundamental frequency for all desired output signals below 12 megacycles, but for operating frequencies higher than 12 megacycles, the crystal frequency is doubled in the plate circuit of the oscillator.

3.8 Keying Circuits.

Grid-block type keying is used for CW operation in the 32S-3. With the key up, a negative voltage is applied to the grids of the second audio amplifier and the second mixer. This prevents the amplified tone oscillator output from actuating the vox circuitry and also cuts off the second mixer. The keying time constant of the second audio amplifier is fast attack and slow release with R127 and C115 determining the fast attack and R125 and C115 determining the slow release. The keying time constant of the second mixer is slow attack and slow release with the slow attack determined by R123, R124, and C81. R123, R124, C81, and C115 determine the slow-release time. When keying takes place, the second audio amplifier and therefore the vox circuitry are actuated before the second mixer. The release times of the second audio amplifier and second mixer are approximately the same. The VOX TIME CONSTANT control adjusts the release time of the vox circuitry to permit fast ON-OFF keying.

The variable R123 provides a choice between the extremes of “hard” and “soft” keying. This control and its effect is described fully in paragraph 2.1.3. Capacitor C115 determines, to a large extent, the release time of the ''break.'' An additional effect is that the larger this capacitor, the greater is the ''lag'' introduced which is characterized by the bell-like type of keying well known to CW operators. The value of C115 and R123 have been chosen to produce generally acceptable keying. While it is not suggested the value of C115 should be changed, if the operator desires an increased amount of the bell-like characteristic, a slightly larger value will produce the effect. The additional ''lag,'' however, will reduce the maximum speed at which the 32S-3 may be satisfactorily keyed.

It is well known that an additional amplifier following an exciter may change the keying characteristics. A well designed and adjusted linear amplifier, such as the 30L-1 or 30S-1, has a negligible effect on keying. A class C amplifier and its associated power supply, however, will generally have considerable effect, which can be determined only by on-the-air operation. There is no better inducement to good keying than a satisfactory method of actually monitoring the radiated signal. Instructions for doing this with the station receiver are included with appropriate Collins equipment and will be found satisfactory.

section 4

service instructions

4.1 General.

This section covers maintenance and service of the 32S-3 Transmitter. It includes information on trouble analysis, signal tracing procedures, voltage and resistance measurements, and alignment procedures. The usefulness of signal level and alignment data given depends upon the accuracy of the test equipment used. Except for an occasional touch-up to compensate for possible component aging, alignment normally will be necessary only if frequency-determining components have been replaced. If servicing requires that the cabinet be removed, proceed as follows:

a. Disconnect all power and external connections.
b. Lift the lid, and remove the two screws located at the front edge of the cabinet.
c. Remove the four feet and the screw located midway between the rear feet.
d. From the rear, push the transmitter chassis forward until the front panel protrudes from the cabinet about an inch.
e. Grasping the front panel at the edges, slide the transmitter out of the cabinet.

NOTE

> Do not lubricate the 70K-2 vfo shaft bearings or the dial drive system bearings. The vfo shaft bearing is lubricated at the factory with a special grease. Dial bearings are the Oilite type which are self-lubricating.

Tube filaments and pilot lamps are connected in series-parallel arrangements for 12- or 24-volt operation. When making tube or lamp replacements, be sure that rated filament currents are the same as the original units.

4.2 Trouble Analysis.

Most cases of trouble can be traced to defective tubes. Many tube checkers cannot duplicate the conditions under which the tubes operate in the transmitter. Substitution of new tubes will sometimes clear an obscure case of tube trouble. Intermittent trouble conditions in tubes can usually be discovered by lightly tapping the envelope. Occasionally, tube pins or sockets terminals will become dirty or corroded causing an intermittent condition. When this situation is suspected, remove the tube and apply a few drops of contact cleaner to the tube pins. Replace the tube, and work it up and down in the socket a few times. Shorted tubes or capacitors will often cause associated resistors to overheat and crack, blister, or discolor. Making the measurements listed in table 4-2 will help to isolate this type of trouble to a particular stage or component.

A logical process of elimination in conjunction with a study of the main schematic diagram, block diagram, and section 3 will aid in isolating trouble. For example, if the transmitter functions properly in the TUNE, LOCK KEY, and CW positions but fails to operate in LSB or USB positions, trouble in the first audio amplifier, cathode follower, balanced modulator, or i-f amplifier should be suspected because this circuitry is not used for TUNE, LOCK KEY, or CW.

If the transmitter is to be returned to the factory or an authorized service agency, a detailed report of operational difficulties will assist the servicing agency in making repairs with a minimum of time and expense. This is particularly important when intermittent trouble is involved.

4.3 Signal Tracing.

Table 4-1 lists significant test points and normal signal levels. Figure 4-1 shows location of adjustments. Before making measurements, set EMISSION switch to USB, and disable the power amplifier by disconnecting screen and plate voltages from both tubes. Set the METER switch to P. A. GRID. Peak EXCITER TUNING, and turn VOX GAIN control counterclockwise until switch clicks. Connect signal generator output to test points indicated in table 4-1, and adjust signal generator output attenuator until PA grid current just begins to show on meter. Attenuator reading is signal voltage necessary at that point. Voltages given in the table are nominal and may vary plus or minus 20 percent. Be careful each time to set signal generator to frequency shown in table. Oscillator output voltage may be measured with a vacuum-tube voltmeter.

4.4 Voltage and Resistance Measurements.

Table 4-2 lists voltage and resistance measurements on all tube sockets except that of V301. Do not open

TABLE 4-1. SIGNAL LEVELS

<table>
<tr><th>TEST POINT</th><th>BAND-SWITCH POSITION</th><th>SIGNAL GENERATOR FREQUENCY</th><th>SIGNAL VOLTAGE AT TEST POINT</th></tr>
<tr><td>V7-2 (grid)
or
V6-5 (plate)</td><td>3.6</td><td>3.7 mc</td><td>2.0 volts</td></tr>
<tr><td></td><td>7.0</td><td>7.1 mc</td><td>1.3 volts</td></tr>
<tr><td></td><td>14.0</td><td>14.1 mc</td><td>1.0 volt</td></tr>
<tr><td></td><td>21.2</td><td>21.3 mc</td><td>1.4 volts</td></tr>
<tr><td></td><td>28A</td><td>28.6 mc</td><td>1.4 volts</td></tr>
<tr><td>V6-1 (grid)</td><td>3.6</td><td>3.7 mc</td><td>110 millivolts</td></tr>
<tr><td></td><td>7.0</td><td>7.1 mc</td><td>90 millivolts</td></tr>
<tr><td></td><td>14.0</td><td>14.1 mc</td><td>90 millivolts</td></tr>
<tr><td></td><td>21.2</td><td>21.3 mc</td><td>85 millivolts</td></tr>
<tr><td></td><td>28A</td><td>28.6 mc</td><td>100 millivolts</td></tr>
<tr><td></td><td>28B, 28C</td><td>According to crystal used</td><td></td></tr>
<tr><td>V5-2 (grid)</td><td>14.0</td><td>3.055 mc</td><td>40 millivolts</td></tr>
<tr><td>V4-2 (grid)</td><td>14.0</td><td>3.055 mc</td><td>30 millivolts</td></tr>
<tr><td>V3-5 (plate)</td><td>14.0</td><td>455 kc</td><td>140 millivolts</td></tr>
<tr><td>V3-1</td><td>14.0</td><td>455 kc</td><td>4 millivolts</td></tr>
<tr><td colspan="4">For following, disconnect signal generator, set EMISSION switch to TUNE, and adjust MIC GAIN for grid current threshold. Also short pin 2 of V2 to ground to prevent bfo leakage voltage from giving erroneous readings. Measure with vtvm.</td></tr>
<tr><td>V2A-8 (cathode)</td><td>Any</td><td>750 cps</td><td>8 millivolts</td></tr>
<tr><td>V2A-9 (grid)</td><td>Any</td><td>750 cps</td><td>11 millivolts</td></tr>
<tr><td>V1B-2 (grid)</td><td>Any</td><td>750 cps</td><td>0.35 volt</td></tr>
<tr><td colspan="4">For following, turn EMISSION switch to USB, and connect audio oscillator to J3. Adjust audio oscillator output for PA grid current threshold, and measure voltage at test point with vtvm. Do not change MIC GAIN setting.</td></tr>
<tr><td>V1A-9 (grid)
or
J3 PHONE PATCH</td><td>Any</td><td>750 cps</td><td>35 millivolts</td></tr>
<tr><td colspan="4">For following, measure at test point with vtvm and r-f probe.</td></tr>
<tr><td>V5-3</td><td>3.6
7.0
14.0
21.2
28A</td><td></td><td>Voltages of 1.0 volt or more are sufficient for all five positions of the band switch.</td></tr>
<tr><td>V4-2 or 7</td><td>Vfo set at 100</td><td></td><td>1.5 volts</td></tr>
<tr><td>R119 arm</td><td>Any</td><td></td><td>1.5 volts</td></tr>
</table>

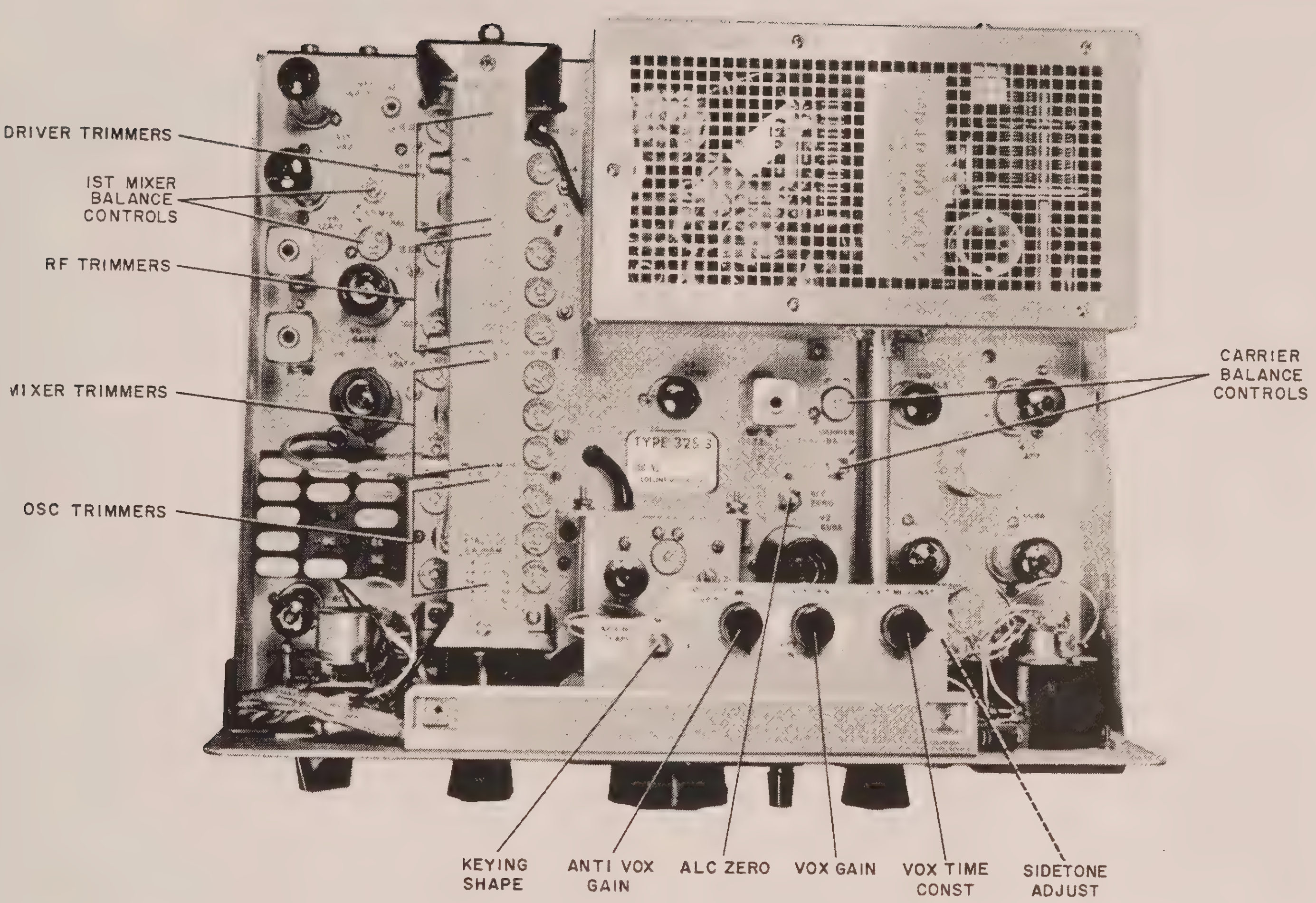


Figure 4-1. Location of Adjustments

TABLE 4-2. VOLTAGE AND RESISTANCE MEASUREMENTS

		PIN NUMBER									
TUBE		1	2	3	4	5	6	7	8	9	PLATE CAP
V1	d-c v	75	0	75			150	1.4	1.9	0	
	a-c v				6.3						
	Ohms	75K	470K	57K	1.5	1.0	77K	470	680 (1)	1 meg	
V2	d-c v	250	-9	125			210	0	5.8	0	
	a-c v				6.3	0					
	Ohms	40K	1 meg	190K	1.1	1.5	60K	0	1K	220K (2)	
V3	d-c v	-.85	+1.6			300	130	0			
	a-c v				6.3						
	Ohms	3.4 meg	170	0.4	0.9	34K	28K	0			
V4	d-c v	250	0	4.8			245	0	4.3		
	a-c v				6.3	6.3				0	
	Ohms	30	46K	820	0.8	0.8	30K	46K	700	1.2	

TABLE 4-2. VOLTAGE AND RESISTANCE MEASUREMENTS (Cont)

		PIN NUMBER									
TUBE		1	2	3	4	5	6	7	8	9	PLATE CAP
V5	d-c v	250	-0.1	5.6			215	-0.6	5.2		
	a-c v				6.3	6.3				0	
	Ohms	30K	800K	820	0.8	0.8	30K	800K	820	1.2	
V6	d-c v	-1.0	0			250	160	+0.8			
	a-c v			6.3	0						
	Ohms	4.0 meg	0	0.8	1.2	30K	120K	180			
V7	d-c v	3.5	0	180			300	0	180	0	
	a-c v				0	6.3					
	Ohms	100	9K	54K	1.1	0.6		0	54K	9K	
V8	d-c v	+0.1	0	+290	+0.1	-71	+0.1	0	0		800
	a-c v		6.3								
	Ohms	2.0	0.6	15K	2.0	50K	2.0	0	0		
V9	d-c v	+0.1	0	+290	+0.1	-71	+0.1	0	0		800
	a-c v							6.3			
	Ohms	2.0	1.1	15K	2.0	50K	2.0	0	0		
V10	d-c v	+0.1	-0.1				0	-0.8			
	a-c v			6.3	0						
	Ohms	100K	100K	1.5	1.0	∞	∞	∞			
V11	d-c v	210	0	300 (6)			300 (6)	50 (7)	5.5	+0.1	
	a-c v				6.3	0					
	Ohms	41K	220K	150K	1.5	1.1	68K	900 (4)	320 (5)	∞	
V12	d-c v	-5.0 to -8.2 (3)	-0.1 to 0.4 (3)			150	150	0			
	a-c v			6.3	0						
	Ohms	100K	10	1.5	2.0	27K	33K	0			
V13	d-c v	150	0			150		0			
	a-c v				0						
	Ohms	32K	0		0	32K		0			
V14	d-c v	190	0	2.5			215	0	2.3	0	
	a-c v				0	0				6.3	
	Ohms	75K	1 meg	1K	1.1	1.1	68K	1 meg	1K	1.5	

(1) LSB and USB, open on TUNE, LOCK KEY, and CW. (2) 33 ohms in CW. (3) Varies with band. (4) Open on USB and LSB. (5) 1500 ohms with S10 open. (6) 150 v on TUNE, LOCK KEY, and CW. (7) 4 v on TUNE, LOCK KEY, and CW.

the oscillator can. Voltages and resistances given in the table are nominal and may vary plus or minus 20 percent. Measurements were taken under the following conditions:

a. EMISSION switch in LSB or USB except where noted. FREQ CONTROL switch in TRANS VFO position for voltage measurements and in OFF position for resistance measurements.

b. All measurements with vtvm and with all tubes in sockets.

c. Voltage measurements made with the tube under test operating normally, vox switch S10 closed, no power output.

d. Resistance measurements made with power supply plug removed from J10 and all other external connections removed.

e. All measurements made from socket pin to ground.

NOTE

When tube filaments and pilot lamps are connected in series-parallel arrangements for 12- or 24-volt operation, the associated voltages listed in the table will vary accordingly.

WARNING

Do not attempt any measurements of resistance without first disconnecting power to the transmitter.

Do not attempt any measurements of power amplifier plate voltage without special high-voltage test probe. Voltage here is 800 volts d-c. Do not make any other voltage or resistance measurements on 32S-3 with high voltage applied. Remove high-voltage rectifier from socket in power supply.

4.5 Alignment Procedures.

4.5.1 TEST EQUIPMENT REQUIRED.

A signal generator, vacuum-tube voltmeter, and a 100-watt, 50-ohm dummy load are required for complete alignment and neutralization. If only touch-up alignment is necessary, and if transmitter develops 50 to 60 volts r-f at PA grids, alignment with PA grid current indication is satisfactory.

4.5.2 455-KC I-F ALIGNMENT. (Refer to figure 4-1 for location of adjustments.)

a. Disconnect the high voltage (800 volts) from the transmitter by removing the high-voltage rectifier tube from the power supply.
b. Disable the screen circuit of the PA tubes by unsoldering one end of the jumper between P.A. DISABLE jacks J9 and J5.
c. Connect the r-f probe of a vtvm across mechanical filter input (junction of C140 and R106 on terminal strip near i-f amplifier V3).
d. Set FREQ CONTROL switch to TRANS VFO. Set EMISSION switch to LSB position.
e. Set MIC GAIN full counterclockwise. Inject a 1000-cps signal into the MIC or PHONE PATCH jack.
f. Any voltage appearing on the vtvm is due to carrier. Adjust carrier balance potentiometer R14 for minimum vtvm indication. This is a coarse adjustment.
g. Advance MIC GAIN until vtvm indicates approximately one volt.
h. Peak T2. Disconnect vtvm.

4.5.3 BAND-PASS I-F ALIGNMENT.

a. Connect signal generator output between pin 2 of the first mixer, V4, and ground. Connect r-f probe of vtvm between junction of C30 and R32 and ground. This point is in the grid circuit of the second mixer, V5.

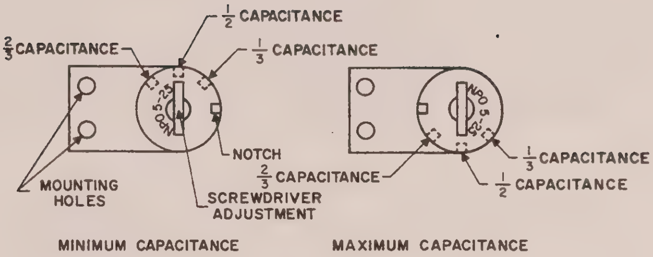

$\frac{1}{2}$ CAPACITANCE
$\frac{2}{3}$ CAPACITANCE
$\frac{1}{3}$ CAPACITANCE
NPO 5-25
NOTCH
MOUNTING HOLES
SCREWDRIVER ADJUSTMENT
$\frac{2}{3}$ CAPACITANCE
$\frac{1}{3}$ CAPACITANCE
$\frac{1}{2}$ CAPACITANCE
NPO 5-25
MINIMUM CAPACITANCE
MAXIMUM CAPACITANCE

Figure 4-2. Ceramic Trimmer Capacitors

b. Tune the signal generator to 3.055 mc. Make a swamping tool by connecting a 1000-ohm resistor and a 0.01-uf capacitor in series and connecting clips to their free pigtails. Connect this swamping tool across terminal 3 (secondary winding) of T1 and ground. This terminal is connected to the T1 end of coupling capacitor C3.
c. Turn on transmitter. Set FREQ CONTROL switch to REC VFO, and set EMISSION switch to TUNE.
d. Keep vtvm indication at about 0.5 volt by adjusting signal generator output, and peak the primary of T1 and L4 with a tuning tool, such as Walsco 2543. The primary slug for T1 is in the bottom of the can.
e. Remove the swamping tool from the secondary of T1, and connect it across the primary of T1 (between pins 1 and 6 of the first mixer, V4). Peak the secondary of T1 (top of shield can). Remove swamping tool.

4.5.4 R-F CIRCUITS ALIGNMENT.

For ordinary touch-up of alignment, it is only necessary to tune and load, in the normal manner, and then touch up the trimmer capacitor settings for maximum grid drive. Keep grid drive low with the MIC GAIN control. It is advisable to perform this alignment with the transmitter PA feeding a well-shielded dummy load. If r-f circuit components have been replaced, or if any extensive repairs have been made in the r-f section, proceed as follows:

a. Adjust C101, C41, C52, and C69 to 2/3 maximum capacity. Adjust C65 to 1/3 maximum capacity. Adjust all other ceramic trimmer capacitors, except CAR BAL capacitor, C11, at 1/2 maximum capacity. Make no changes in settings of neutralizing capacitors C55,- C57, and C71. Figure 4-2 shows maximum-, minimum-, and half-capacity settings of ceramic trimmers.
b. Set BAND switch to 3.6, tuning dial to 100, and EXCITER TUNING to 2.1 on the logging scale. Set EMISSION switch to TUNE for all the following steps.
c. Connect the r-f probe of a vtvm from PA tube grid (pin 5 of either tube) to ground.
d. Adjust MIC GAIN to produce approximately 15 volts indication on the vtvm.
e. Adjust all slugs (except L11) for peak vtvm indication. The driver plate circuit has two slug-tuned coils, L11 and L16. The slug at the extreme rear of the slug rack is L11. Do not adjust L11 at this time.

CAUTION

Be sure slugs are not tuned to the variable i-f frequency (3.155 to 2.955 mc).

f. Set BAND switch to 14.0, tuning dial to 150, and EXCITER TUNING control to 6.4 on the logging scale.

g. Adjust MIC GAIN for 15-volt vtvm reading. Peak L11 and all 14-mc trimmers for maximum vtvm reading. Keep vtvm reading at 15 volts by adjusting MIC GAIN control as necessary.

h. Set BAND switch to 28A, tuning dial to 100, and EXCITER TUNING control to 9.0 on the logging scale.

i. Adjust MIC GAIN for 15-volt reading on vtvm. Peak all 28-mc trimmers for maximum reading on the vtvm, keeping the vtvm reading at 15 volts with the MIC GAIN control.

j. Set BAND switch to 21.2, dial to 100, EXCITER TUNING to 7.8 on logging scale.

k. Peak all 21-mc trimmers for maximum vtvm reading. Keep the vtvm indication at approximately 15 volts by adjusting the MIC GAIN control as necessary.

l. Set BAND switch to 14.0, dial to 150, EXCITER TUNING to 6.4 on the logging scale.

m. Peak all 14-mc trimmers for maximum vtvm reading. Keep vtvm reading at approximately 15 volts by adjusting the MIC GAIN control as necessary.

n. Set BAND switch to 7.0, dial to 150, EXCITER TUNING control to 3.8 on the logging scale. Adjust MIC GAIN control for 15-volt reading on the vtvm.

o. Peak all 7-mc trimmers for maximum vtvm reading, adjusting MIC GAIN as necessary to keep indication at approximately 15 volts.

p. Set BAND switch to 3.6, dial to 100, and EXCITER TUNING control to 2.1 on the logging scale. Adjust MIC GAIN for 15-volt reading on the vtvm.

q. Peak all 3.5-mc trimmers for maximum vtvm reading, adjusting MIC GAIN control as necessary to keep indication at approximately 15 volts.

r. Remove the r-f probe. Touch up the trimmer adjustments on each band to compensate for r-f probe capacity. Use grid current as indication, and adjust the MIC GAIN control as necessary to keep the indication low (between 2 and 6 db on lower scale).

CAUTION

Do not change trimmer settings greatly, or the above procedure will have to be done over.

4.5.5 CRYSTAL OSCILLATOR ALIGNMENT.

a. This procedure is a refinement which peaks the oscillator plate circuit in the center of the 200-kc tuning range. Turn the tuning dial to 100.

b. Set BAND switch to 28A. Adjust EXCITER TUNING control for a peak on the PA grid current meter. Set EMISSION switch to TUNE. Increase MIC GAIN setting if necessary to obtain grid current indication.

c. Repeak the (E) 28 trimmer in the crystal oscillator plate circuit.

d. Set the BAND switch to 21.2, and adjust EXCITER TUNING control for peak in grid current.

e. Repeak the (D)21 trimmer in the oscillator plate circuit.

f. Repeat this procedure with BAND switch settings of 14.0, 7.0, and 3.6.

4.5.6 PA NEUTRALIZING.

a. Disable PA plate and screen circuits as in paragraph 4.5.2, steps a and b.

b. Connect a 50-ohm, noninductive, 100-watt dummy load to R.F. OUT jack J12.

c. Connect vtvm r-f probe across 50-ohm dummy load.

d. Set FREQ CONTROL switch to TRANS VFO, BAND switch to 28A, EMISSION switch to LOCK KEY, and METER switch to P. A. GRID. Set dial to 100.

e. Advance MIC GAIN setting as necessary, and adjust EXCITER TUNING for peak PA grid current.

f. Adjust P. A. TUNING control for maximum r-f voltage indication on vtvm. Adjust MIC GAIN as necessary to keep this indication below 0.5 volt.

g. From bottom chassis, adjust the PA neutralizing capacitor, C71, for a dip in the vtvm indication. This voltage is PA plate feedthrough.

h. Remove the r-f probe connection from the 50-ohm load.

4.5.7 DRIVER NEUTRALIZING.

a. Restore high voltage to the PA tubes by replacing the rectifier tube. Reconnect the jumper between J5 and J9 PA DISABLE jacks.

b. Remove the filament voltage to the driver tube, V7, by unsoldering the lead connected to pin 5. As an alternative, an old 6CL6 tube with no shorts and with pin 4 or 5 clipped off may be substituted for V7.

c. Connect the r-f probe of the vtvm across the dummy load at J12.

d. Set the FREQ CONTROL switch to TRANS VFO, BAND switch to 28A, EMISSION switch to LOCK KEY, and METER switch to P. A. PLATE.

e. Set PA bias for 40-ma static plate current.

f. Increase MIC GAIN setting, and adjust EXCITER TUNING and P. A. TUNING controls for maximum voltage across the 50-ohm load. This level will be less than 0.3 volt.

g. Adjust the driver neutralizing capacitor, C57, for a voltage dip. This capacitor is located on the shield partition closest to the shield can. Refer to figure 4-1.

h. Restore V7 to normal operation.

4.5.8 FEEDBACK NEUTRALIZING.

a. Set FREQ CONTROL to TRANS VFO position, BAND switch to 28A position, EMISSION switch to TUNE, and METER switch to P. A. PLATE position.

b. Adjust EXCITER TUNING control for a peak in PA plate current.

c. Dip the PA plate current with the P. A. TUNING control.

d. Repeat steps b and c above.

e. Adjust the feedback neutralizing capacitor, C55, (below chassis) until the PA plate current dip and the grid current dip coincide. Readjust the MIC GAIN as necessary to hold PA grid current to midscale during this adjustment.

f. Set BAND switch to 21.2, peak EXCITER TUNING control, and dip PA plate current with P. A. TUNING control.

g. Check that PA plate current dip and PA grid current dip occur at same setting of P. A. TUNING control.

h. Repeat this check on bands 14.2, 7.0, and 3.6.

4.5.9 VFO SIDEBAND FREQUENCY SHIFT ADJUSTMENT.

CAUTION

Do not make this adjustment unless switching from one sideband to the other makes readjustment of tuning dial necessary to keep output signal from shifting. It will always be necessary, after this adjustment, to make carrier balance (null) adjustment given in paragraph 4.5.10 following.

a. Set EMISSION switch to LSB, METER switch to P. A. PLATE, BAND switch to 14.0 and tuning dial to 100. Turn VOX GAIN (under top cover) full counterclockwise until switch clicks.

b. Rotate CARRIER BAL potentiometer R14 to one end to allow carrier feedthrough.

c. Adjust EXCITER TUNING control for maximum plate current, and dip the plate current with the P. A. TUNING control.

d. Tune the station receiver to zero beat with the transmitter.

e. Set EMISSION switch to USB, and adjust trimmer C308 (top of vfo can) for zero beat.

4.5.10 CARRIER BALANCE (NULL) ADJUSTMENT.

a. Set BAND switch to 3.6. Set tuning dial to 100. Connect dummy load to transmitter output. Tune and load transmitter into dummy load.

b. Set EMISSION switch to LSB position, and turn MIC GAIN control full counterclockwise.

c. Connect an r-f vtvm across dummy load and set to lowest scale, or use the lowest scale on an r-f wattmeter connected in series with the load.

d. Key the transmitter by turning VOX GAIN control counterclockwise until the switch clicks or by grounding the push-to-talk jack, J4. If vtvm indication is 0.2 volt or more, adjust CARRIER BAL potentiometer R14 and trimmer C11 until the vtvm indication is less than 0.2 volt. These adjustments interact, so adjust first one and then the other until neither produces any decrease in vtvm indication.

e. Switch the EMISSION switch back and forth between LSB and USB positions and check that the carrier is balanced at less than 0.2 volt indication on vtvm. If the carrier is not balanced to less than 0.2 volt for either sideband, repeat step d until vtvm indication is less than 0.2 volt for either sideband.

4.5.11 ALC ZERO ADJUSTMENT.

a. Set EMISSION switch to USB position. Tune and load the transmitter to 14.1 mc.

b. Turn MIC GAIN control to minimum, and set METER switch to ALC position. Short the PTT line in one of the following ways: Close the PTT switch on the microphone, short the PTT jack J4, rotate VOX GAIN control under the top cover fully counterclockwise to the PTT position, or (if using a 312B-4 station control) place the 312B-4 FUNCTION switch to the TRANSMIT ONLY position.

c. Adjust ALC ZERO potentiometer (top chassis near V2) until meter indicates zero. Remove PTT short.

4.5.12 FIRST MIXER BALANCE ADJUSTMENT.

a. Tune and load the transmitter into dummy load at 21.0 mc. Loosely couple a communications receiver to the transmitter output. Tune the communications receiver back and forth across 21.455 mc until the signal is heard.

b. Adjust the mixer balance potentiometer, R27, and the trimmer, C26, for minimum output. These adjustments interact, so adjust first one and then the other until neither produces any decrease in output.

4.5.13 VFO DIAL CALIBRATION.

In case the variable frequency oscillator in the 32S-3 has drifted and there is no end-point spread, it can be calibrated by loosening the setscrews on the dial hub and slipping the dial mechanism on the oscillator shaft until zero beat occurs at the center of the window. Use the 75S-3/3A and 32S-3 calibrating procedure, paragraph 2.2.3. Make certain there is no end-point spread before making this adjustment; zero beat should occur at 0 and 200 on the dial without any readjustment of the hairline.

If there is end-point spread and zero beat does not coincide at 0 and 200 on the dial, make the following adjustments:

a. Calibrate the 75S-3/3A at 200 on its dial. Calibrate the 32S-3 against the 75S-3/3A (near 200 on the 32S-3 dial).

b. With ZERO SET knob, set hairline to 200.

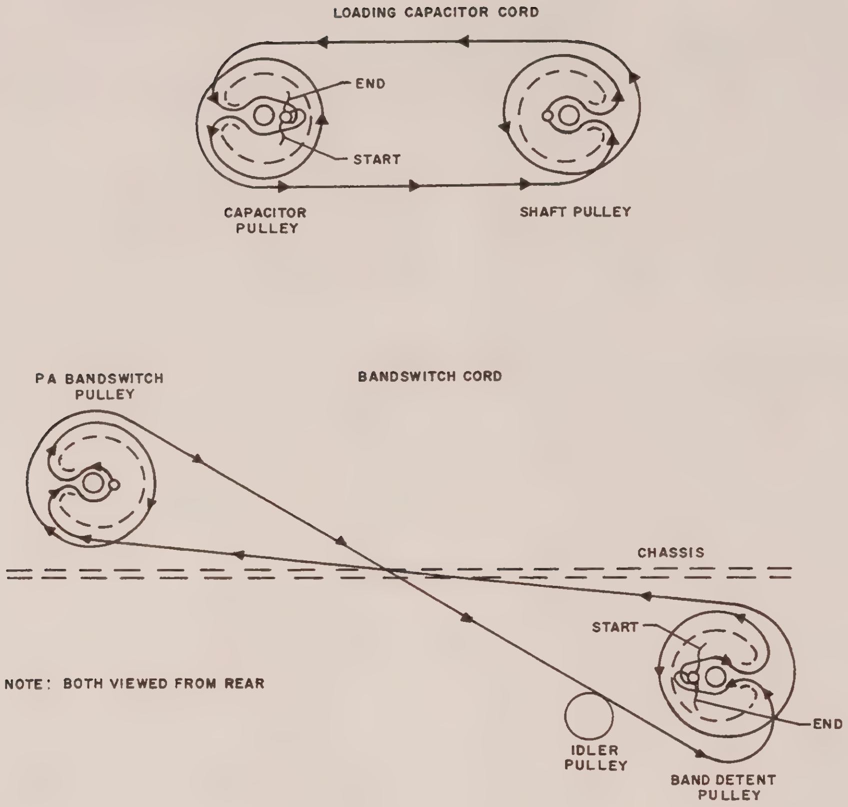
c. Calibrate the 75S-3/3A at 0 on its dial. Calibrate the 32S-3 against the 75S-3/3A. Note difference in kilocycles between hairline and zero on 32S-3 dial (example 1.5 kc).

d. Without moving the hairline, move the dial to the other side of zero at twice the noted error. (Example 3 kc.)

e. Adjust L302 for zero beat. The slug-tuned inductor, L302, is accessible at the top of the vfo can.

f. Move the hairline to zero.

g. Check zero beat at 200 on the dial. If zero beat does not occur at exactly 200, repeat steps b through e.



NOTE: BOTH VIEWED FROM REAR

Figure 4-3. Dial Cord Stringing Diagram

h. If, after adjustment of end points, the hairline is not vertical in the window, loosen the setscrews on the dial hub and move the dial with respect to the oscillator shaft so that zero beat occurs with the end points (0 and 200) set at center.

i. After these adjustments of the vfo calibration, make the vfo sideband frequency shift adjustment according to paragraph 4.5.9.

4.5.14 PA LOADING TRIMMER ADJUSTMENTS

These trimmer capacitors are adjusted to provide the required total output capacity for matching 50-ohm antenna loads on the amateur bands with the INCR LOAD control set at the 50Ω mark. Normally, they will not need readjustment, since, when the PA is properly loaded, the tuning is relatively broad. If it is determined that adjustment is necessary, proceed as follows:

a. Refer to figure 6-4 for location of the loading trimmers.

b. Connect a 50-ohm nonreactive dummy load to the 32S-3 RF OUT jack.

c. Set INCREASE LOADING control to the 50Ω mark.

d. Tune the 32S-3 at 21.3 mc and set the EMISSION switch to LOCK KEY.

e. Set MIC GAIN to the point which begins to produce PA GRID current; that is, grid current threshold.

f. Adjust C146 until the PA draws 230-ma plate current at the dip.

g. Tune the 32S-3 at 28.6 mc and check the PA plate current. If not 230 ma, readjust C146 for best compromise between the 21.3 and 28.6-mc plate current readings.

h. Tune the 32S-3 at 14.150 mc. Set the MIC GAIN to grid current threshold.

i. Adjust C80 as in step f.

j. Tune the 32S-3 at 7.150 mc. Set the MIC GAIN to grid current threshold.

k. Adjust C135 as in step f.

l. Tune the 32S-3 at 3.700 mc. Set the MIC GAIN to grid current threshold.

m. Adjust C136 as in step f.

4.6 Dial Cord Replacement. (Refer to figure 4-3.)

4.6.1 BAND-SWITCH CORD.

a. Place BAND switch in position 2A. Remove all power from 32S-3, and remove PA compartment top cover. Short the PA plates to ground with a screwdriver blade. Check to see that the movable contacts of both S5 and S6 are at position 13 and 14. This may be determined by counting clockwise on the wafer from the S-mark, looking at the wafer on the side marked with the X, and beginning with the first position clockwise from the X-mark as 1. Count all positions, including the holes in the empty spaces where there are no lugs mounted.

b. Use a knife blade or small screwdriver to pry the tab open far enough to release the old cord. This tab is located on the inner face of the pulley. Remove the broken or defective cord from the bandswitch pulleys near the front panel. One is located above the chassis and the other below the chassis. Loosen the idler pulley so it will not be in the way during restringing.

c. Replace the old cord with three feet of new cord from Collins part number 432-1009-00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 4-3. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Make sure a short piece of spaghetti is slipped over the plastic covered cord so that it acts as extra insulation under the tab. This prevents r-f currents from melting the plastic and shorting the wire core to ground. Mash the tab down to clamp the cord securely. Tighten the idler to bring the cord to tension.

e. Check again that the switch sections S5 and S6 are properly positioned according to the instructions of step a above. If they are not, loosen the shaft coupler and turn the switch shaft to bring the contacts to proper position. Tighten the coupler.

f. Apply a little airplane cement on dial cord knots to help keep them tight. After cement is dry, trim the loose ends back not closer than 1/2 inch from knots.

4.6.2 LOADING CAPACITOR CORD.

a. Place INCR LOAD control at 10 on the logging scale. This positions the INCR LOAD control horizontally and points at the meter. Remove all power from the 32S-3, and remove the PA compartment top cover. Short the PA plate caps to ground with a screwdriver blade. Check that the loading capacitor is fully meshed.

b. Use a knife or small screwdriver, and pry the tab open far enough to release the old cord. Remove the broken or defective dial cord from the loading capacitor pulleys.

c. Replace the old cord with two feet of new cord from Collins part number 432-1009-00. When ordering dial cord, be sure to state the desired length in feet.

d. String the cord according to the appropriate part of figure 4-3. Make sure the cord turns do not overlap on the pulleys. Pull the cord tight and tie to the tab. Make sure a short piece of spaghetti is slipped over the plastic covered cord so that it acts as extra insulation under the tab. This prevents r-f currents from melting the plastic and shorting the wire core to ground. Mash the tab down to clamp the cord securely.

e. Check to see that the INCR LOAD control is at 10 on the logging scale, and that the loading capacitor is fully meshed. If not, loosen the shaft coupler, mesh the capacitor plates manually, and tighten the coupler.

f. Dab a little airplane cement on the knots in the dial cords to help hold them tight. After the cement is dry, trim the loose ends back no closer than 1/2 inch from the knot.

section 5

specifications

5.1 32S-3 Transmitter.

The 32S-3 Transmitter develops a minimum of 100 watts output power on 80-, 40-, and 20-meter amateur bands. Power output is 90 watts minimum on 15 meters and 80 watts minimum on 10 meters.

5.2 Frequency Coverage.

The 32S-3 has band-switch positions and corresponding crystal sockets for fourteen 200-kc bands. Crystals are furnished for complete coverage of all amateur bands except 10 meters. One 10-meter crystal is furnished, and the crystal mounting block has extra sockets for two additional crystals. One other spare crystal socket and band-switch position are provided for an additional band between 9.5 and 15.0 mc. Other crystals may be substituted for those furnished to place the transmitter at other frequencies throughout the range.

5.3 Requirements for Operation.

The transmitter requires the following power supply voltages:

+800 volts d-c at 230 ma for PA plates
+275 volts d-c at 190 ma for PA screens and low-voltage plates
Bias voltage adjustable between -60 and -80 volts d-c
6.3 volts a-c at 6.0 amperes or
6.0 volts d-c at 6.0 amperes or
12.0 to 14.0 volts d-c at 3.0 amperes or
24.0 to 28.0 volts d-c at 1.5 amperes

These voltages may be supplied by Collins Power Supplies 516F-2 (115-volt a-c source), MP-1 (12-volt d-c source), 516E-2 (24-volt d-c source), or 516F-1 with adapter cable. The antenna and feed system must present a 50-ohm load with swr not exceeding 2.0 to 1. Any high impedance crystal or dynamic microphone and any key may be used with the 32S-3 Transmitter.

5.4 Specifications.

Size	6-9/16 inches high, 14-3/4 inches wide, 11-1/2 inches deep.
Weight	16 pounds.
Frequency range	3.4 to 5.0 and 6.5 to 30.0 megacycles. With crystals furnished, bands are as follows: 80 meters - 3.4 to 3.6 mc, 3.6 to 3.8 mc, and 3.8 to 4.0 mc. 40 meters - 7.0 to 7.2 mc, and 7.2 to 7.4 mc. 20 meters - 14.0 to 14.2 mc, and 14.2 to 14.4 mc. 15 meters - 21.0 to 21.2 mc, 21.2 to 21.4 mc, and 21.4 to 21.6 mc. 10 meters - 28.5 to 28.7 mc.
Mode	Single sideband (either sideband selectable) or CW.
Type of service	SSB - continuous; CW - 50 percent duty cycle.
Plate power input	175 watts PEP on SSB, 160 watts on CW.
Power output	100 watts PEP (nominal) into 50 ohms, 80, 40, and 20 meters. 90 watts on 15 meters and 80 watts on 10 meters.
Microphone input impedance	High impedance.

R-f output impedance	50 ohms with not more than 2.0-to-1 swr.
Frequency stability	Total variation after warmup not more than 100 cps.
Calibration accuracy	1 kilocycle.
Keying	Break-in.
Audio-frequency response	300-2400 cps ±6 db.
Carrier suppression.	Carrier 50 db down on output signal.
Unwanted sideband	50 db down from output signal.
Oscillator feedthrough or mixer products (undesired)	50 db down from output signal.
Second harmonic	40 db down from output signal.
Third order distortion	30 db down from output signal.

5.5 Tube, Fuse, and Semiconductor Complement.

TABLE 5-1. TUBES, FUSES, AND SEMICONDUCTORS

SYMBOL	FUNCTION	TYPE
V1A	First audio amplifier	1/2 6U8A
V1B	Second audio amplifier	1/2 6U8A
V2A	Cathode follower	1/2 6U8A
V2B	Beat-frequency oscillator	1/2 6U8A
V3	I-f amplifier	6CB6
V4	First mixer	12AT7
V5	Second mixer	12AT7
V6	R-f amplifier	6AH6
V7	Driver	6CL6
V8	Power amplifier	6146
V9	Power amplifier	6146
V10	Vox/anti-vox rectifier	6AL5
V11A	Vox relay actuator	1/2 6U8A
V11B	Tone oscillator	1/2 6U8A
V12	Crystal oscillator	6CB6
V13	Voltage regulator	0A2
V14A	Vox amplifier	1/2 12AT7
V14B	Anti-vox amplifier	1/2 12AT7

TABLE 5-1. TUBES, FUSES, AND SEMICONDUCTORS (Cont)

SYMBOL	FUNCTION	TYPE
V301	Vfo	7543
CR1, CR2 CR3, CR4	Balanced modulator	FA4000
CR301	Frequency shift switch	1N34A
CR5, CR6	Alc rectifier	1N458
CR7	Sidetone limiter	1N458
CR8	Vox limiter	1N458
F1	Power supply fuse	4 amp, 125 v

5.6 Available Accessories.

TABLE 5-2. AVAILABLE ACCESSORIES

ITEM	FUNCTION	COLLINS PART NUMBER
312B-4 Station Control	Speaker, phone patch directional wattmeter, and station control	522-1167-00
MP-1	Mobile power supply for 12-volt source	522-2750-00
516F-2 A-C Power Supply	A-c power supply	522-1170-00
516E-2 D-C Power Supply	D-c power supply for 24-volt source	522-0846-00
Extra crystals	Additional band coverage	See section 6, Parts List
4-foot r-f cables	Extra r-f patch cables	426-5076-00
4-foot shielded cables	Extra non-r-f patch cables	426-2027-00
351E-1 Mounting Frame	Mount for 32S-3	522-1479-00
351E-2 Mounting Frame	Mount for 312B-4	522-1480-00
PJ-068	Mike plug	361-0001-00
302C-3 Directional Wattmeter	Measure forward and reflected power	522-2051-00

section 6

parts list

ITEM	DESCRIPTION	COLLINS PART NUMBER
	32S-3 TRANSMITTER	522-2955-00
C1	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 0. 1 uf, -20% +80%, 500 v dc; Sprague Electric Co. of Wisconsin part no. 41C92	913-3152-00
C2	CAPACITOR, FIXED, MICA: 220 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10F221J	912-3903-00
C3	CAPACITOR, FIXED, CERAMIC: 4700 uuf, ±20%, 500 v d-c Solar Mfg. Corp	913-3012-00
C4	CAPACITOR, FIXED, CERAMIC DIELECTRIC: Same as C1	913-3152-00
C5	CAPACITOR, FIXED, CERAMIC: 0. 02 uf, +100% -20%, 500 v d-c; Erie Resistor Corp part no. 841011 W5VO 203Z	913-2142-00
C6	CAPACITOR, FIXED, ELECTROLYTIC: dual section, 8 uf, +75% -10%, 300 v d-c, 25 uf, +75% -10%, 25 v d-c; Sprague Electric Co. part no. D27958	183-1479-00
C7	NOT USED	
C8	CAPACITOR, FIXED, ELECTROLYTIC: 4 uf, -10% +100%, 350 v d-c; Sprague Electric Co. part no D29343	183-1783-00
C9	CAPACITOR, FIXED, CERAMIC DIELECTRIC: 2. 47 uf, -20% +80%, 25 v dc; Sprague Electric Co. part no 5C114	913-0804-00
C10	CAPACITOR, FIXED, CERAMIC: 10, 000 uf, ±20%, 500 v dc; Solar Mfg. Corp.	913-3013-00
C11	CAPACITOR, VARIABLE, CERAMIC: 5.0 uuf min to 25.0 uuf max, 350 v d-c; Erie Resistor Corp. part no. 557006 COPO39R	917-1194-00
*C12	CAPACITOR, FIXED, MICA: 10 uuf ±5%, 500 v d-c; Electro Motive part no. DM10C100J	912-3837-00
*C12	CAPACITOR, FIXED, MICA: 15 uuf ±5%, 500 v d-c; Electro Motive part no. DM10C150J	912-3839-00
*C12	CAPACITOR, FIXED, MICA: 20 uuf ±5%, 500 v d-c; Electro Motive part no. DM10E200J	912-3841-00
*C12	CAPACITOR, FIXED, MICA: 27 uuf ±5%, 500 v d-c; Electro Motive part no. DM10E270J	912-3844-00
*C12	CAPACITOR, FIXED, MICA: 33 uuf ±5%, 500 v d-c; Electro Motive part no. DM10E330J	912-3848-00
*C12	CAPACITOR, FIXED, MICA: 39 uuf ±5%, 500 v d-c; Electro Motive part no. DM10E390J	912-3852-00
*C12	CAPACITOR, FIXED, MICA: 47 uuf ±5%, 500 v d-c; Electro Motive part no. DM10E470J	912-3856-00
*C12	CAPACITOR, FIXED, MICA: 56 uuf ±5%, 500 v d-c; Electro Motive part no. DM10F560J	912-3861-00
*C12	CAPACITOR, FIXED, MICA: 62 uuf ±5%, 500 v d-c; Electro Motive part no. DM10F620J	912-3864-00
*C12	CAPACITOR, FIXED, MICA: 68 uuf ±5%, 500 v d-c; Electro Motive part no. DM10F680J	912-3867-00
*C12	CAPACITOR, FIXED, MICA: 82 uuf ±5%, 500 v d-c; Electro Motive part no. DM10F820J	912-3873-00
C13 thru C16	CAPACITOR, FIXED, CERAMIC: same as C1	913-3013-00
C17	CAPACITOR, FIXED, MICA: 180 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10F181J	912-3897-00
C18	CAPACITOR, FIXED, MICA: 82 uuf, ±5%, 500 v d-c; Electro Motive part no. DM15F820J-500WV	912-2810-00
C19	NOT USED	
C20	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C21	CAPACITOR, FIXED CERAMIC DIELECTRIC: 220 uuf ±20%, 500 v dc	913-3011-00
C22	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C23	CAPACITOR, FIXED, MICA: 10 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10C100J	912-3837-00
C24	P/O T1	
C25	P/O T1	
C26	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C27	P/O L4	
C28	CAPACITOR, FIXED, CERAMIC: 3 uuf, ±1/2 uuf, 500 v d-c; Centralab	916-0145-00
C29	P/O L4	
C30	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +100% -20%, 500 v d-c; Erie Resistor Corp part no. 851000 X5U0 102Z	913-3009-00
C31	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C32	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C33	CAPACITOR, FIXED, MICA: same as C23	912-3837-00
C34	CAPACITOR, FIXED, MICA: same as C23	912-3837-00
C35	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C36	CAPACITOR, VARIABLE, CERAMIC: 8 uuf min to 50 uuf max, 350 v d-c; Erie Resistor Corp part no. 557006 U2PO 34R	917-1196-00
C37	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C38	CAPACITOR, FIXED, MICA: 51 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10E510J	912-3858-00
C39	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C40	CAPACITOR, FIXED, MICA: 240 uuf, ±2%, 500 v d-c; Electro Motive part no. DM15F241G-500WV	912-2842-00
C41	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C42	CAPACITOR, FIXED, MICA: 680 uuf, ±2%, 300 v d-c; Electro Motive Co. part no. DM15E681G-300WV	912-3498-00
C43	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C44	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C45	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C46	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C47	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C48	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C49	CAPACITOR, FIXED, MICA: same as C38	912-3858-00
C50	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C51	CAPACITOR, FIXED, MICA: same as C40	912-2842-00
C52	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C53	CAPACITOR, FIXED, MICA: 360 uuf, ±2%, 500 v d-c; Electro Motive part no. DM15F361G-500WV	912-2854-00
C54	CAPACITOR, FIXED, MICA: same as C2	912-3903-00
C55	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C56	CAPACITOR, FIXED, CERAMIC: 1000 uuf, ±10%, 500 v d-c; Erie Resistor Corp. part no. 327029 H3MD 102K	913-4061-00
C57	CAPACITOR, VARIABLE, CERAMIC: 1.5 uuf min to 7.0 uuf max, 350 v d-c; Erie Resistor Corp. part no 557006 COPO 10R	917-1192-00
C58	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C59	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C60	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C61	CAPACITOR, FIXED, CERAMIC: 10 uuf, ±10%, 5000 v d-c; Centralab part no. DA855-035	913-0972-00
C62	CAPACITOR, FIXED, CERAMIC: same as C56	913-4061-00
C63	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C64	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C65	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00

*Chosen per operational requirements.

ITEM	DESCRIPTION	COLLINS PART NUMBER
C66	CAPACITOR, FIXED, MICA: same as C38	912-3858-00
C67	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C68	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C69	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C70	CAPACITOR, FIXED, MICA: same as C2	912-3903-00
C71	CAPACITOR, VARIABLE, AIR: 1.8 uuf min to 50 uuf max, 1250 v a-c; E. F. Johnson part no. 160-104-3	922-0031-00
C72	CAPACITOR, FIXED, CERAMIC: 0.001 uuf, +100% -20%, 2000 v d-c; Centralab part no. DA172-057CB	913-3537-00
C73 thru C75	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C76	CAPACITOR, FIXED, CERAMIC: same as C72	913-3537-00
C77	CAPACITOR, VARIABLE, AIR: 12.0 uuf min to 250.0 uuf max, 1000 v rms; Hammerlund Co., Inc. part no. 4112-26	920-0136-00
C78	CAPACITOR, FIXED, MICA: 33 uuf, ±5%, 500 v d-c; Electro Motive Mfg. Co. part no. DM10E330J	912-3848-00
C79	CAPACITOR, FIXED, MICA: 130 uuf, ±5%, 500 v d-c; Electro Motive part no. DM15F131J-500WV	912-2825-00
C80	CAPACITOR, VARIABLE, MICA: 100 uuf to 500 uuf; 1000 v d-c; Electro Motive part no. PD 52414	918-0006-00
C81	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C82	CAPACITOR, FIXED, CERAMIC: same as C5	913-2142-00
C83	CAPACITOR, FIXED, CERAMIC: same as C4	913-3152-00
C84	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C85	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C86	P/O T2	
C87	CAPACITOR, FIXED, PAPER: 0. 1 uf, ±20%, 400 v dc; Sprague Electric Co. part no. 160P10404	931-0169-00
C88	CAPACITOR, FIXED, PAPER: 0.5 uf, -10% +20%, 200 v d-c; Sangamo Electric Co. part no. 330205	931-0169-00
C89	CAPACITOR, FIXED, MICA: 15 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10C150J	912-3839-00
C90	CAPACITOR, FIXED, MICA: 100 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10F101J	912-3879-00
C91	CAPACITOR, FIXED, MICA: 1000 uuf, ±5%, 500 v d-c; Electro Motive part no. DM19F102J-500WV	912-3001-00
C92	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C93	CAPACITOR, FIXED, MICA: same as C89	912-3839-00
C94	CAPACITOR, FIXED, MICA: same as C90	912-3879-00
C95	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C96	CAPACITOR, VARIABLE, CERAMIC: same as C11	917-1194-00
C97	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C98	P/O T1	
C99	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C100	CAPACITOR, FIXED, MICA: 200 uuf, ±10%, 500 v d-c; Electro Motive Co. part no. DM15F201K-500WV	912-2838-00
C101	CAPACITOR, VARIABLE, CERAMIC: same as C36	917-1196-00
C102	CAPACITOR, FIXED, MICA: 270 uuf, ±5%, 500 v d-c; Electro Motive part no. DM15F271J-500WV	912-2846-00
C103	CAPACITOR, FIXED, MICA: 68 uuf, ±5%, 500 v d-c; Electro Motive part no. DM10F680J	912-3867-00
C104	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C105	CAPACITOR, FIXED, MICA: 82 uuf, ±5%, 500 v dc; MIL Type CM05C820J03	912-2810-00
C106	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C107	CAPACITOR, FIXED, CERAMIC: same as C4	913-3152-00
C108	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C109	CAPACITOR, FIXED, MICA: 330 uuf, ±5%, 500 v d-c; Electro Motive part no. DM15F331J-500WV	912-2852-00
C110	CAPACITOR, FIXED, MICA: same as C109	912-2852-00
C111	CAPACITOR, FIXED, MICA: same as C109	912-2852-00
C112	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C113	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C114	NOT USED	
C115	CAPACITOR, FIXED, PAPER: 33 uuf ±20%, 200 wvdc Sprague Electric Co. part no. 160P33402	931-6842-00
C116	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C117	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C118	CAPACITOR, FIXED, CERAMIC: same as C4	913-3152-00
C119	CAPACITOR, FIXED, CERAMIC: same as C5	913-2142-00
C120	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C121	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C122	NOT USED	
C123	CAPACITOR, FIXED, CERAMIC: same as C76	913-3537-00
C124	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C125	CAPACITOR, FIXED, CERAMIC: 500 uuf, ±10%, 500 v d-c; Erie Resistor Corp part no. 331013 X5U0 501K	913-0998-00
C126 thru C130	CAPACITOR, FIXED, CERAMIC: same as C125	913-0998-00
C131	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C132	CAPACITOR, FIXED, MICA: 330 uuf, ±2%, 500 v d-c; Electro Motive part no. DM15F331G-500WV	912-2851-00
C133	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C134	CAPACITOR, FIXED, CERAMIC: 1.0 uuf, ±1/4 uuf, 500 v d-c; Centralab	916-0070-00
C135	CAPACITOR, VARIABLE, MICA: same as C80	918-0006-00
C136	CAPACITOR, VARIABLE, MICA: same as C80	918-0006-00
C137	CAPACITOR, FIXED, CERAMIC: 1000 uuf, +80% -20%, 500 v d-c; Erie Resistor Corp part no. 327047 X5T0 102Z	913-1292-00
C138	NOT USED	
C139	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C140	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C141	CAPACITOR, TUBULAR, CERAMIC: 6 uuf, ±1/2 uuf, 500 v d-c; Centralab	916-0122-00
C142	CAPACITOR, FIXED, CERAMIC: same as C4	913-3152-00
C143	CAPACITOR, FIXED, ELECTROLYTIC: 25 uf, -10% +100%, 150 v d-c; Sprague Electric Co. part no D25082	183-1352-00
C144	CAPACITOR, FIXED, CERAMIC: 2 uuf, ±1/2 uuf, 500 v d-c; Centralab	916-0076-00
C145	CAPACITOR, FIXED, CERAMIC: 0.1 uf, -30% +80%, 75 v d-c; Centralab part no. DA150-001CB	913-3794-00
C146	CAPACITOR, VARIABLE, MICA: 65 uuf to 320 uuf, 1000 v d-c test voltage; Electro Motive Type 30	918-0010-00
C147	CAPACITOR, VARIABLE, AIR: dual section; 13.5 uuf min to 452.3 uuf max each section, 360 v a-c, 60 cps min breakdown; Radio Condenser Co. part no. CN-2521574	920-0138-00
C148	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C149	CAPACITOR, FIXED, MICA: same as C38	912-3858-00
C150 thru C155	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C156	CAPACITOR, FIXED, MICA: same as C38	912-3858-00
C157	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C158	CAPACITOR, FIXED, CERAMIC: 10,000 uuf ±20%, 1000 v d-c; Centralab part no. DA134-048CB	913-3922-00
C159	CAPACITOR, FIXED, CERAMIC: same as C158	913-3922-00
C160 thru C164	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C165	CAPACITOR, FIXED, CERAMIC: same as C76	913-3537-00
C166	CAPACITOR, FIXED, CERAMIC: same as C137	913-1292-00
C167	CAPACITOR, FIXED, CERAMIC: same as C137	913-1292-00
C168	CAPACITOR, FIXED, CERAMIC: same as C30	913-3009-00
C169	CAPACITOR, FIXED, CERAMIC: same as C5	913-2142-00
C170 thru C172	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C173	CAPACITOR, FIXED, PAPER: same as C88	931-0169-00
C174	CAPACITOR, FIXED, CERAMIC: same as C10	913-3013-00
C175	CAPACITOR, FIXED, MICA: 100 uuf ±1%, 500 v d-c; Electro Motive part no. DM10F101J	912-3879-00
C176	CAPACITOR, FIXED, ELECTROLYTIC: same as C143	183-1352-00
C177	CAPACITOR, FIXED, ELECTROLYTIC: same as C8	183-1783-00
C178	CAPACITOR, FIXED, CERAMIC: same as C5	913-2142-00
C179	CAPACITOR, FIXED, CERAMIC: same as C3	913-3012-00
C180	CAPACITOR, FIXED, MICA: same as C90	912-3879-00
C181	CAPACITOR, FIXED, CERAMIC: 5 uuf ±10%, 500 v d-c; Centralab part no. DA855-007	913-0092-00
C182	CAPACITOR, FIXED, MICA: same as C89	912-3839-00
C183	CAPACITOR, FIXED, ELECTROLYTIC: 20 uf -10% +100%, 25 v d-c; Sprague Electric Type 30D	183-1165-00
C184	CAPACITOR, FIXED, ELECTROLYTIC: same as C183	183-1165-00
C185	CAPACITOR, FIXED, ELECTROLYTIC: same as C183	183-1165-00
C186	CAPACITOR, FIXED, CERAMIC: same as C4	913-3152-00
C187	CAPACITOR, FIXED CERAMIC DIELECTRIC: 6. 01 uf; G M V tolerance, 500 v dc, Centralab Division of Globe Union Inc. 10A142-001CB	913-3129-00
C188	CAPACITOR, FIXED, CERAMIC DIELECTRIC: same as C1	913-3152-00
C189	CAPACITOR, FIXED, CERAMIC DIELECTRIC: same as C21	913-3011-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
CR1	SEMICONDUCTOR DEVICE SET: four matched silicon diodes, encapsulated; 0. 2 in. by 0. 468 in. by 0. 5 in. ; Fairchild Camera and Instrument Corp. Semiconductor Division part no. FA4092	353-3271-00
CR2	SEMICONDUCTOR DEVICE SET: same as CR1	353-3271-00
CR3	SEMICONDUCTOR DEVICE SET: same as CR1	353-3271-00
CR4	SEMICONDUCTOR DEVICE SET: same as CR1	353-3271-00
CR5	SEMICONDUCTOR DEVICE, DIODE: silicon; hermetically sealed; Hughes Aircraft Co. part. no. 1N458	353-0205-00
CR6	SEMICONDUCTOR DEVICE, DIODE: same as CR5	353-0205-00
CR7	SEMICONDUCTOR DEVICE, DIODE: same as CR5	353-0205-00
CR8	SEMICONDUCTOR DEVICE, DIODE: same as CR5	353-0205-00
DS1	LAMP, INCANDESCENT: miniature, bayonet base; T-3-1/4 pilot light bult; 6. 3 v, 0. 150 amp, C-212 filament; General Electric Co. part no. 47	262-3240-00
DS2	LAMP, INCANDESCENT: same as DS1 (P/O M1)	262-3240-00
FL1	FILTER, MECHANICAL: 455-kc center frequency and 2. 1-kc 6-db bandwidth	262-9427-00
J1	JACK, TELEPHONE: 3 circuit; J2-1F contact arrangement; 3/16 in. dia by 1 in. lg plug accommodated; 49/64 in. by 15/16 in. by 1-3/8 in. Switchcraft type JJ-033 accepts PJ-068 plug or equivalent (such as PL-68)	358-1050-00
J2	JACK, TELEPHONE: steel, miniature, panel mtd; Switchcraft, Inc. part no. 3501FP	360-0148-00
J3	JACK, TIP: accommodates 1/8 in. plug; ceramic insulation, brass contacts; Cinch Mfg. Co. part no. 201 11 01018	360-0088-00
J4	JACK, TIP: same as J3	360-0088-00
J5	JACK, TIP: same as J3	360-0088-00
J6	JACK, TELEPHONE: same as J2	360-0148-00
J7	JACK, TELEPHONE: same as J2	360-0148-00
J8	JACK, TIP: same as J3	360-0088-00
J9	JACK, TIP: same as J3	360-0088-00
J10	CONNECTOR, RECEPTACLE, ELECTRICAL: 11 male contacts, 5 amp; Amphenol Borg part no. 86-CP11-1008	372-1950-00
J11 thru J21	JACK, TIP: same as J3	360-0088-00
K1	RELAY, ARMATURE: 2C, 2A contact arrangement; 50 ma at 250 v d-c at/ or 300 ma at 115 v a-c; 6 ma dc nom coil current; 14,000 ohms ±10% at +25°C coil resistance; C.P. Clare Co. part no. A95183	972-1353-00
K2	RELAY, ARMATURE: antenna switching type, 2C contact arrangement, 2 amp, 175 w, 2.30 mc; 1 inductive winding, 115 v d-c, 10,000 ohms; Potter & Brumfield, Inc. part no. KR-2565	970-1914-00
L1	NOT USED	
L2	COIL, RADIO FREQUENCY: single layer wound; 1000 uh ±5% inductance; 16 ohms max dc resistance; 700 v rms; Delevan part no. 2500-28	240-2540-00
L3	COIL, RADIO FREQUENCY: 2000 uh ±5% inductance; 27. 5 ohms max d-c resistance; 700 v rms; Delevan part no. 2500-42	240-2547-00
L4	P/O T1 (incls C27 & C29)	
L5	COIL, RADIO FREQUENCY: single layer wound, 220 uh ±10% inductance; 5. 9 ohms dc resistance; Delevan Electronics Corp.	240-1636-00
L6	COIL, RADIO FREQUENCY: single layer wound	544-3135-002
L7	COIL, RADIO FREQUENCY: same as L5	240-1636-00
L8	COIL, RADIO FREQUENCY: same as L6	544-3135-002
L9	COIL, RADIO FREQUENCY: universal wound; 4 pi, 139 turns each; 2 mh, 100 ma; National Coil Co. part no. C-0047409	240-0134-00
L10	COIL, RADIO FREQUENCY: 22 uh, ±10%, 0.31 ohms d-c max resistance; 1330 ma; powdered iron coil form; Jeffers Electronics part no. 10404-20	240-0186-00
L11	COIL, RADIO FREQUENCY: single layer wound	543-8028-002
L12	P/O Z1	
L13	P/O Z2	
L14	COIL, RADIO FREQUENCY: single layer wound	543-8024-00
L15	TRANSFORMER, RADIO FREQUENCY: 1 winding; 1.015 in. dia by 3 in., lg	506-7848-002
L16	COIL, RADIO FREQUENCY: single layer wound	543-8123-002
L17	COIL, RADIO FREQUENCY: same as L5	240-1636-00
L18	COIL, RADIO FREQUENCY: same as L5	240-1636-00
L19	COIL, RADIO FREQUENCY: 220 uh, 65 at 790 KC: 5. 3 mc resonant freq, 140 ma, 760 ohms; James Millen Mfg. Co. Inc. part no. J31-220	240-2524-00
L20	COIL, RADIO FREQUENCY: 198 turns; universal wound, 6 pi, 40 AWG: 220 uh, 7. 20 ohms, 0. 21 amps; shielded	756-7558-002
L21	COIL, RADIO FREQUENCY: single layer wound	544-3136-002
L22	COIL, RADIO FREQUENCY: same as L3	240-2547-00
L23	COIL, RADIO FREQUENCY: same as L2	240-2540-00
L24	COIL, RADIO FREQUENCY: multiple section duolateral wound; 4 sections; 2. 5 mh, 35 to 50 ohms, 0. 125 amp; Maguire Industries, Inc. part no. 02242	240-2100-00
L25	COIL, RADIO FREQUENCY: single layer wound	543-8068-00
L26	COIL, RADIO FREQUENCY: same as L3	240-2547-00
L27	COIL, RADIO FREQUENCY: same as L5	240-1636-00
L28	COIL, RADIO FREQUENCY: same as L3	240-2547-00
L29	P/O Z4	
L30	P/O Z5	
L31	COIL, RADIO FREQUENCY: 120 uh, ±10%, 4.00 ohms max d-c resistance; 425 ma; powdered iron coil form; Jeffers Electronic part no. 10404-36	240-0194-00
L32	COIL, RADIO FREQUENCY: same as L2	240-2540-00
M1	MULTIMETER: scale marked 0 thru 400 ma, 0 thru 16 db; linear, 40 scale divisions; 46 ohms meter res. ; 2. 217 in. by 2-3/8 in. by 2-3/8 in. Electric Design Model 2-2	458-0454-00
MP1	PULLEY, IDLER: black molded polystyrene or nylon; 5/8 in. dia by 1/8 in. lg; 1/2 in. dia by 1/8 in. w groove; Richco Plastics Co. part no. PV-3	281-0020-00
MP2	PULLEY, FLAT: steel rim, brass body; 1. 375 in. dia by 0. 712 in. lg. 0. 375 in. dia bore	543-7739-00
MP3	PULLEY, FLAT: steel; 1. 375 in. dia by 1 in. lg overall; 0. 187 in. dia bore	543-8021-002
MP4	PULLEY, IDLER: aluminum; chromate dip; 0. 562 in. by 0. 685 in. lg	543-8087-002
MP5	PULLEY, FLAT: steel; 1.375 in. dia by 0.508 in. lg; 0.187 in. dia bore	544-3132-002
MP6	FOOT, CABINET: aluminum; 0.984 in. dia by 0.719 in. lg	543-8101-002
MP7	FOOT, CABINET: same as MP6	543-8101-002
O1	KNOB: push-on type, spring steel; 0.250 in. od, flatted 0.156 in.	543-8039-002
O2	KNOB: same as O1	543-8039-002
O3	KNOB, SPINNER: plastic; 0.859 in. by 2.078 in. by 2.515 in.	553-5787-003
O4	KNOB: same as O1	543-8039-002
O5	KNOB: same as O1	543-8039-002
O6	KNOB: aluminum; black semigloss enamel; 0.031 wide grooved by 0.020 in. deep; 11/16 in. dia by 11/16 in. lg	553-2557-002
O7	KNOB: same as O1	543-8039-002
O8	INDICATOR, MOLDED: black nylon; 0.861 in. dia	543-8088-002
O9	KNOB: fluted, push-on type; incl spring; spring steel w/ spring steel finish; 0.250 in. od, flatted to 0.156 in.	543-8044-00
O10	KNOB, FIDUCIAL: aluminum; black anodized enamel; 0.421 in. dia by 1/2 in. lg	543-8078-002
O11	KNOB: phenolic; 1.009 in. w across flats by 0.750 in. thk	543-8043-00
O12	LEVER TRIMMING: nylon, black; 29/64 in. by 0. 861 in. by 1. 305 in.	544-3148-003
O13	KNOB: set screw type, black phenolic, brass insert for 1/4 in. shaft, 13/32 in. by 1 in. dia, 8-32 NC-2 set screw supplied; Harry Davies Moulding Co. part no. 1400	281-0069-00
O14	KNOB: same as O13	281-0069-00
O15	KNOB: same as O13	281-0069-00
R1	NOT USED	
R2	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1 w; Allen-Bradley type GB	745-3422-00
R3	RESISTOR, FIXED, COMPOSITION: 0.47 megohm, ±10%, 1/2 w; Allen-Bradley type EB	745-1464-00
R4	RESISTOR, FIXED, COMPOSITION: 470 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1338-00
R5	RESISTOR, FIXED, COMPOSITION: 47,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1422-00
R6	RESISTOR, FIXED, COMPOSITION: 0.10 megohm, ±10%, 1/2 w; Allen-Bradley type EB	745-1436-00
R7	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5694-00
R8	RESISTOR, VARIABLE: composition; 2500 ohms one section; 500,000 2nd section; ±30%, 1/4 w Chicago Telephone Supply type 45	376-2648-00
R9	RESISTOR, FIXED, COMPOSITION: 0.22 megohm, ±10%, 1/2 w; Allen-Bradley type EB	745-1450-00
R10	RESISTOR, FIXED, COMPOSITION: 1000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1352-00
R11	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1 w; Allen-Bradley type GB	745-3394-00
R12	NOT USED	
R13	NOT USED	
R14	RESISTOR, VARIABLE: 1000 ohms to ±20%, 0. 2 v	376-4623-00
R15	NOT USED	
R16	RESISTOR FIXED, COMPOSITION: same as R6	745-1436-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R17	RESISTOR, FIXED, WIREWOUND: 1000.0 ohms, ±10%, 5 w at 40 deg C, 2.5 w at 150 deg C; International Resistance Co. PW5-1001-10	710-9113-00
R18	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±10%, 1 w; Allen-Bradley type GB	745-3415-00
R19	RESISTOR, FIXED, COMPOSITION: 120 ohms, ±10%, 1/2 w; Allen-Bradley EB	745-1314-00
R20	RESISTOR, VARIABLE, COMPOSITION: 250 ohms; ±30%, 0.2 w; Chicago Telephone Supply type 70	376-4602-00
R21	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%, 1 w;Allen-Bradley type GB	745-3296-00
R22	RESISTOR, FIXED, COMPOSITION: 39,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1419-00
R23	RESISTOR, FIXED, COMPOSITION: 180 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1321-00
R24	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R25	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R26	RESISTOR, FIXED, COMPOSITION: 560 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1342-00
R27	RESISTOR, VARIABLE: composition; 500 ohms, ±30%, 0.2 w; Chicago Telephone Supply type 70	376-4603-00
R28	RESISTOR, FIXED, COMPOSITION: same as R26	745-1342-00
R29	RESISTOR, FIXED, COMPOSITION: 4700 ohms ±10%, 2 w; Allen-Bradley type HB	745-5680-00
R30	RESISTOR, FIXED, COMPOSITION: same as R29	745-5680-00
R31	RESISTOR, FIXED, COMPOSITION: 12,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1398-00
R32	RESISTOR, FIXED, COMPOSITION: 33 ohms ±10%, 1/2 w; Allen-Bradley type EB	745-1289-00
R33	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R34	RESISTOR, FIXED, COMPOSITION: 2200 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1366-00
R35	RESISTOR, FIXED, COMPOSITION: 820 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1349-00
R36	RESISTOR, FIXED, COMPOSITION: same as R35	745-1349-00
R37	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R38	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R39	RESISTOR, FIXED, COMPOSITION: same as R23	745-1321-00
R40	RESISTOR, FIXED, COMPOSITION: 10,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1394-00
R41	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5708-00
R42	RESISTOR, FIXED, COMPOSITION: 150 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1317-00
R43	P/O Z1	
R44	RESISTOR, FIXED, COMPOSITION: 12 ohms, ±5%, 1/2 w; Allen-Bradley type EB	745-1271-00
R45	RESISTOR, FIXED, COMPOSITION: same as R44	745-1271-00
R46	RESISTOR, FIXED, COMPOSITION: same as R44	745-1271-00
R47	RESISTOR, FIXED, COMPOSITION: 0.47 megohms P/M 10%, 1 w; MIL Type RC32GF474K	756-3464-00
R48	P/O Z2	
R49 thru R51	RESISTOR, FIXED, COMPOSITION: same as R44	745-1271-00
R52	RESISTOR, FIXED, FILM: 825 ohms, ±1%, 1/4 w Allen-Bradley type CB	705-7092-00
R53	RESISTOR, FIXED, COMPOSITION: 18,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1405-00
R54	RESISTOR, FIXED, COMPOSITION: same as R10	745-1352-00
R55	RESISTOR, FIXED, COMPOSITION: 0.68 megohm, ±10%, 1/2 w; Allen-Bradley type EB	745-1471-00
R56	RESISTOR, FIXED, COMPOSITION: 3.3 megohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1499-00
R57	RESISTOR, FIXED, COMPOSITION: 1 megohm, ±10%, 1/2 w; Allen-Bradley type EB	745-1478-00
R58	RESISTOR, FIXED, COMPOSITION: 33,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1415-00
R59	RESISTOR, FIXED, COMPOSITION: same as R9	745-1450-00
R60	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1429-00
R61	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R62	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R63	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00
R64	RESISTOR, FIXED, COMPOSITION: same as R60	745-1429-00
R65	RESISTOR, FIXED, COMPOSITION: same as R57	745-1478-00
R66	RESISTOR, FIXED, COMPOSITION: same as R10	745-1352-00
R67 thru R69	RESISTOR, FIXED, COMPOSITION: same as R9	745-1450-00
R70	RESISTOR, FIXED, COMPOSITION: same as R32	745-1289-00
R71	RESISTOR, FIXED, COMPOSITION: 68,000 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5729-00
R72	RESISTOR, FIXED, COMPOSITION: 1500 ohms, ±10%, 1/4 w; Allen Bradley type CB	745-0755-00
R73	RESISTOR, FIXED, COMPOSITION: same as R55	745-1471-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
R74	RESISTOR, VARIABLE: composition; 500,000 ohms, ±30%, 1/4 w; Chicago Telephone Supply Co., part no. LL6066	376-7201-00
R75	RESISTOR, FIXED, COMPOSITION: same as R57	745-1478-00
R76	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00
R77	RESISTOR, FIXED, COMPOSITION: same as R10	745-1352-00
R78	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R79	RESISTOR, FIXED, COMPOSITION: 8.2 megohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1517-00
R80	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R81	RESISTOR, FIXED, COMPOSITION: same as R79	745-1517-00
R82	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00
R83	RESISTOR, FIXED, COMPOSITION: same as R10	745-1352-00
R84	RESISTOR, FIXED, COMPOSITION: same as R57	745-1478-00
R85	RESISTOR, VARIABLE: composition; 500,000 ohms, ±30%, 1/4 w; Chicago Telephone Supply Co., part no. LL6067	376-7202-00
R86	RESISTOR, VARIABLE: composition; 10 megohms, ±40%, 1/4 w; Chicago Telephone Supply Co. part no. LL6071	376-7206-00
R87	RESISTOR, FIXED, COMPOSITION: same as R4	745-1338-00
R88	RESISTOR, FIXED, COMPOSITION: 1500 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1359-00
R89	RESISTOR, FIXED, COMPOSITION: same as R71	745-5729-00
R90	RESISTOR, FIXED, COMPOSITION: same as R9	745-1450-00
R91	RESISTOR, FIXED, COMPOSITION: same as R3	745-1464-00
R92	RESISTOR, FIXED, COMPOSITION: 47 ohms ±10%, 1/2 w; Allen-Bradley type EB	745-1296-00
R93	RESISTOR, FIXED, COMPOSITION: 8200 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5691-00
R94	RESISTOR, FIXED, COMPOSITION: same as R93	745-5691-00
R95	RESISTOR, FIXED, COMPOSITION: 100 ohms ±10%, 1/2 w; Allen-Bradley type EB	745-1310-00
R96	RESISTOR, FIXED, COMPOSITION: same as R3	745-1464-00
R97	NOT USED	
R98	RESISTOR, VARIABLE: composition; 5 megohms, ±30%, 0.2 w; Chicago Telephone Supply type 70	376-4629-00
R99	RESISTOR, FIXED, COMPOSITION: 2.2 megohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1492-00
R100	RESISTOR, FIXED, COMPOSITION: same as R9	745-1450-00
R101	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R102	RESISTOR, FIXED, COMPOSITION: 180 ohms, ±10%, 1/4 w; MIL type RC07GF19K	745-0722-00
R103	RESISTOR, FIXED, COMPOSITION: 15,000 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5701-00
R104	RESISTOR, FIXED, COMPOSITION: same as R92	745-1296-00
R105	RESISTOR, FIXED, COMPOSITION: same as R40	745-1394-00
R106	RESISTOR, FIXED, COMPOSITION: 22,000 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1408-00
R107	RESISTOR, FIXED, COMPOSITION: same as R40	745-1394-00
R108	NOT USED	
R109	RESISTOR, FIXED, COMPOSITION: same as R92	745-1296-00
R110	RESISTOR, FIXED, COMPOSITION: same as R3	745-1464-00
R111	RESISTOR, FIXED, COMPOSITION: same as R3	745-1464-00
R112	RESISTOR, FIXED, COMPOSITION: same as R71	745-5729-00
R113	RESISTOR, FIXED, WIREWOUND: 1750 ohms, ±10%, 3 w; IRC part no. PW3-1750-10	710-9183-00
R114	RESISTOR, FIXED, WIREWOUND: 15,000 ohms, ±10%, 7 w IRC type PW7	710-9001-00
R115	NOT USED	
R116	RESISTOR, FIXED, COMPOSITION: same as R95	745-1310-00
R117	RESISTOR, FIXED, COMPOSITION: same as R6	745-1436-00
R118	RESISTOR, FIXED, COMPOSITION: same as R57	745-1478-00
R119	P/O Z4	
R120	P/O Z5	
R121	RESISTOR, FIXED, COMPOSITION: 47 ohms, ±10%, 2 w; Allen-Bradley type HB	745-5596-00
R122	RESISTOR, FIXED, COMPOSITION: same as R121	745-5596-00
R123	RESISTOR, VARIABLE: composition; 1 megohm, ±30%, 0.2 w; Chicago Telephone Supply type 70	376-4630-00
R124	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00
R125	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00
R126	RESISTOR, FIXED, COMPOSITION: same as R58	745-1415-00
R127	RESISTOR, FIXED, COMPOSITION: same as R92	745-1296-00
R128	NOT USED	
R129	RESISTOR, FIXED, COMPOSITION: 4700 ohms, ±10%, 1/2 w; Allen-Bradley type EB	745-1380-00
R130	RESISTOR, FIXED, COMPOSITION: same as R102	745-0722-00
R131	RESISTOR, VARIABLE: composition; 250,000 ohms, ±20%, 1/4 w; Chicago Telephone Supply	376-2698-00
R132	RESISTOR, FIXED, COMPOSITION: same as R95	745-1310-00
R133	RESISTOR, FIXED, COMPOSITION: same as R95	745-1310-00
R134	RESISTOR, FIXED, COMPOSITION: same as R92	745-1296-00
R135	RESISTOR, FIXED, COMPOSITION: same as R95	745-1310-00
R136	RESISTOR, FIXED, COMPOSITION: same as R95	745-1310-00
R137	RESISTOR, FIXED, COMPOSITION: same as R21	745-3296-00
R138	RESISTOR, FIXED, COMPOSITION: same as R5	745-1422-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
S1	SWITCH SECTION, ROTARY: 1 circuit (1 pole), 14 positions, 1 section; 1 moving contact, 8 fixed contacts; Oak Mfg. Co. part no. 88127-CK	269-1980-00
S2	SWITCH SECTION, ROTARY: same as S1	269-1980-00
S3	SWITCH SECTION, ROTARY: same as S1	269-1980-00
S4	SWITCH SECTION, ROTARY: 2 circuit (2 pole), 14 positions; 2 moving contacts, 17 fixed contacts; Oak Mfg. Co. part no. 88216-CK	269-1983-00
S5	SWITCH SECTION, ROTARY: 1 circuit (1 pole), 14 positions, 1 section; 1 moving contact, 10 fixed contacts; Oak Mfg. Co. part no 88128-CK	269-1981-00
S6	SWITCH SECTION, ROTARY: 1 circuit (1 pole), 14 positions, 1 section; 1 moving contact, 6 fixed contacts; Oak Mfg Co. part no. 88130-CK	269-1982-00
S7	SWITCH, ROTARY: 2 circuit, (2 pole), 3 positions, 1 section; 2 moving contacts, 8 fixed contacts; Oak Mfg. Co. part no. 188004-F1	259-0955-00
S8	SWITCH, ROTARY: 10 circuit (10 pole) 5 positions, 5 sections; 2 moving contacts, 12 fixed contacts; Oak Mfg. Co. part no. 225173-F5	259-1628-00
S9	SWITCH, ROTARY: 8 circuit (8 pole) 4 positions, 2 sections; 8 moving contacts, 32 fixed contacts, Oak Mfg. Co. part no. 88002-JK2AC	259-0953-00
S10	P/O R74	
S11	SWITCH ROTARY: 1 circuit (1 pole) 14 positions, 1 moving contact, 15 fixed contacts; Oak Mfg. Co. part no. 192796-CK	269-2023-00
S12	P/O R8	
S13	SWITCH SUBASSEMBLY: miniature telephone relay type stack switch; 2A 1C contact arrangement; 3 amps, 300 w, a-c noninductive; Switchcraft, Inc. part no. XA-12566	266-0131-00
T1	TRANSFORMER, COIL ASSEMBLY: IF transformer w/ center tapped primary; 3.055 ac center frequency; ±200-kc tuning range; Communications Coil Co. part no. X-001-2X-002-2	278-1712-00
T2	TRANSFORMER, INTERMEDIATE FREQUENCY: 455-kc center frequency; 440-kc to 470 kc tuning range; 300 v rms; Communications Coil Co. part no. X-682-1	278-0696-00
V1	ELECTRON TUBE: triode-pentode; Radio Corp. of America part no. 6U8A	255-0328-00
V2	ELECTRON TUBE: same as V1	255-0328-00
V3	ELECTRON TUBE: pentode, Radio Corp of America part no 6CB6	255-0207-00
V4	ELECTRON TUBE: glass envelope, twin triode; Radio Corp. of America part no. 12AT7	255-0205-00
V5	ELECTRON TUBE: same as V4	255-0205-00
V6	ELECTRON TUBE: pentode; Radio Corp. of America part no. 6AH6	255-0191-00
V7	ELECTRON TUBE: power pentode; RCA part no. 6CL6	255-0216-00
V8	ELECTRON TUBE: beam power, pentode; Sylvania part no. 6146A	256-0149-00
V9	ELECTRON TUBE: same as V8	256-0149-00
V10	ELECTRON TUBE: twin diode; Tung-Sol Electric, Inc. part no. 6AL5	257-0018-00
V11	ELECTRON TUBE: same as V1	255-0328-00
V12	ELECTRON TUBE: pentode: same as V3	255-0207-00

ITEM	DESCRIPTION	COLLINS PART NUMBER
V13	ELECTRON TUBE: voltage regulator; Radio Corp. of America part no. OA2	257-0052-00
V14	ELECTRON TUBE: same as V4	255-0205-00
V15	ELECTRON TUBE: same as V10	257-0018-00
W1	CABLE ASSEMBLY: microphone, terminated one end w/ phone plug, other end stripped and tinned, 8 strands no. 36 AWG copper wire, 2 strands no. 31 AWG phosphor bronze wire, insulated; 4 in. lg; Labtronics type C105	426-1810-00
Y1	CRYSTAL UNIT, QUARTZ: 6555.000 kc frequency; Midland Mfg. Co. Inc. part no. 9009	290-9009-00
Y2	CRYSTAL UNIT, QUARTZ: 6755.000 kc frequency; Midland Mfg. Co. Inc. part no. 9010	290-9010-00
Y3	CRYSTAL UNIT, QUARTZ: 6955.000 kc frequency; Midland Mfg. Co. Inc. part no. 9011	290-9011-00
Y4	CRYSTAL UNIT, QUARTZ: 10155.00 kc frequency; Midland Mfg. Co. Inc. part no. 9027	290-9027-00
Y5	CRYSTAL UNIT, QUARTZ: 10355.00kc frequency; Midland Mfg. Co. Inc. part no. 9028	290-9028-00
Y6	CRYSTAL UNIT, QUARTZ: 8577.500 kc frequency; Midland Mfg. Co. Inc. part no. 9062	290-9062-00
Y7	CRYSTAL UNIT, QUARTZ: 8677.500 kc frequency; Midland Mfg. Co. Inc. part no. 9063	290-9063-00
Y8	CRYSTAL UNIT, QUARTZ: 12077.50kc frequency; Midland Mfg. Co. Inc. part no 9097	290-9097-00
Y9	CRYSTAL UNIT, QUARTZ: 12177.50 kc frequency; Midland Mfg. Co. Inc. part no. 9098	290-9098-00
Y10	CRYSTAL UNIT, QUARTZ: 12277.50 kc frequency; Midland Mfg. Co. Inc. part no. 9099	290-9099-00
Y11	CRYSTAL UNIT, QUARTZ: 15827.50 kc frequency; Midland Mfg. Co. Inc. part no. 9201	290-9201-00
Y12	CRYSTAL UNIT, QUARTZ: 453.650 kc frequency; Midland Mfg. Co.	290-8705-00
Y13	CRYSTAL UNIT, QUARTZ: 456.350 kc frequency; Midland Mfg. Co.	290-8706-00
Z1	SUPPRESSOR, PARASITIC: 2 turns no. 18 AWG; 470 ohms, 2 w	540-5641-00
Z2	SUPPRESSOR, PARASITIC: same as Z1	540-5641-00
Z3	SUPPRESSOR, PARASITIC: 6 turns no. 22 AWG; 33 ohms, 1/2 w	545-6146-00
Z4	SUPPRESSOR, PARASITIC: 4 turns no. 20 AWG; 47 ohms, 1/2 w	548-8217-00
Z5	SUPPRESSOR, PARASITIC: same as Z4	548-8217-00
	OSCILLATOR, 70K-2	555-0464-00
	OSCILLATOR: 6.3 v ac or dc at 300 ma; 1.5 to 3.0 volts rf output; 2.5 to 2.7 megacycles per second; 2-15/64 in. lg by 2-1/2 in. w by 3-31/32 in., w	555-0464-00
V301	ELECTRON TUBE: Sharp cut-off pentode; RCA Electron Tube Division of Radio Corp. of America part no. 7543	257-0301-00

GENERAL COVERAGE CRYSTALS AVAILABLE

CRYSTAL FREQUENCY (kc)	FOR	OPERATING FREQUENCY (mc)	PART NUMBER
6555.000		3.4-3.6	290-9009-00
6755.000		3.6-3.8	290-9010-00
6955.000		3.8-4.0	290-9011-00
7155.000		4.0-4.2	290-9012-00
7355.000		4.2-4.4	290-9013-00
7555.000		4.4-4.6	290-9014-00
7755.000		4.6-4.8	290-9015-00
7955.000		4.8-5.0	290-9016-00
9755.000		6.6-6.8	290-9025-00
9955.000		6.8-7.0	290-9026-00
10155.000		7.0-7.2	290-9027-00
10355.000		7.2-7.4	290-9028-00
10555.000		7.4-7.6	290-9029-00
10755.000		7.6-7.8	290-9030-00
10955.000		7.8-8.0	290-9031-00
11155.000		8.0-8.2	290-9032-00
11355.000		8.2-8.4	290-9033-00
11555.000		8.4-8.6	290-9034-00
11755.000		8.6-8.8	290-9035-00
11955.000		8.8-9.0	290-9036-00
12155.000		9.0-9.2	290-9037-00
12355.000		9.2-9.4	290-9038-00
12555.000		9.4-9.6	290-9039-00
12755.000		9.6-9.8	290-9040-00
12955.000		9.8-10.0	290-9041-00
13155.000		10,0-10.2	290-9042-00
13355.000		10.2-10.4	290-9043-00
13555.000		10.4-10.6	290-9044-00
13755.000		10.6-10.8	290-9045-00
13955.000		10.8-11.0	290-9046-00
14155.000		11.0-11.2	290-9047-00
14355.000		11.2-11.4	290-9048-00
14555.000		11.4-11.6	290-9049-00
14755.000		11.6-11.8	290-9050-00
14955.000		11.8-12.0	290-9051-00
7577.500		12.0-12.2	290-9052-00
7677.500		12.2-12.4	290-9053-00
7777.500		12.4-12.6	290-9054-00
7877.500		12.6-12.8	290-9055-00
7977.500		12.8-13.0	290-9056-00
8077.500		13.0-13.2	290-9057-00
8177.500		13.2-13.4	290-9058-00
8277.500		13.4-13.6	290-9059-00
8377.500		13.6-13.8	290-9060-00
8477.500		13.8-14.0	290-9061-00
8577.500		14.0-14.2	290-9062-00
8677.500		14.2-14.4	290-9063-00
8777.500		14.4-14.6	290-9064-00
8877.500		14.6-14.8	290-9065-00
8977.500		14.8-15.0	290-9066-00
9077.500		15.0-15.2	290-9067-00
9177.500		15.2-15.4	290-9068-00
9277.500		15.4-15.6	290-9069-00
9377.500		15.6-15.8	290-9070-00
9477.500		15.8-16.0	290-9071-00
9577.500		16.0-16.2	290-9072-00
9677.500		16.2-16.4	290-9073-00
9777.500		16.4-16.6	290-9074-00
9877.500		16.6-16.8	290-9075-00
9977.500		16.8-17.0	290-9076-00
10077.500		17.0-17.2	290-9077-00
10177.500		17.2-17.4	290-9078-00
10277.500		17.4-17.6	290-9079-00
10377.500		17.6-17.8	290-9080-00
10477.500		17.8-18.0	290-9081-00
10577.500		18.0-18.2	290-9082-00
10677.500		18.2-18.4	290-9083-00
10777.500		18.4-18.6	290-9084-00
10877.500		18.6-18.8	290-9085-00
10977.500		18.8-19.0	290-9086-00
11077.500		19.0-19.2	290-9087-00
11177.500		19.2-19.4	290-9088-00
11277.500		19.4-19.6	290-9089-00
11377.500		19.6-19.8	290-9090-00
11477.500		19.8-20.0	290-9091-00
11577.500		20.0-20.2	290-9092-00
11677.500		20.2-20.4	290-9093-00
11777.500		20.4-20.6	290-9094-00
11877.500		20.6-20.8	290-9095-00
11977.500		20.8-21.0	290-9096-00
12077.500		21.0-21.2	290-9097-00
12177.500		21.2-21.4	290-9098-00
12277.500		21.4-21.6	290-9099-00
12377.500		21.6-21.8	290-9100-00
12477.500		21.8-22.0	290-0101-00
12577.500		22.0-22.2	290-9102-00
12677.500		22.2-22.4	290-9103-00
12777.500		22.4-22.6	290-9104-00
12877.500		22.6-22.8	290-9105-00
12977.500		22.8-23.0	290-9106-00
13077.500		23.0-23.2	290-9107-00
13177.500		23.2-23.4	290-9108-00
13277.500		23.4-23.6	290-9109-00
13377.500		23.6-23.8	290-9110-00
13477.500		23.8-24.0	290-9111-00
13577.500		24.0-24.2	290-9112-00
13677.500		24.2-24.4	290-9113-00
13777.500		24.4-24.6	290-9114-00
13877.500		24.6-24.8	290-9115-00
13977.500		24.8-25.0	290-9116-00
14077.500		25.0-25.2	290-9117-00
14177.500		25.2-25.4	290-9118-00
14277.500		25.4-25.6	290-9119-00
14377.500		25.6-25.8	290-9120-00
14477.500		25.8-26.0	290-9121-00
14577.500		26.0-26.2	290-9122-00
14677.500		26.2-26.4	290-9123-00
14777.500		26.4-26.6	290-9124-00
14877.500		26.6-26.8	290-9125-00
14977.500		26.8-27.0	290-9126-00
15077.500		27.0-27.2	290-9127-00
15177.500		27.2-27.4	290-9128-00
15277.500		27.4-27.6	290-9129-00
15377.500		27.6-27.8	290-9130-00
15477.500		27.8-28.0	290-9131-00
15527.500		27.9-28.1	290-9142-00
15577.500		28.0-28.2	290-9132-00
15627.500		28.1-28.3	290-9143-00
15677.500		28.2-28.4	290-9133-00
15727.500		28.3-28.5	290-9144-00
15777.500		28.4-28.6	290-9134-00
15877.500		28.6-28.8	290-9135-00
15927.500		28.7-28.9	290-9145-00
15977.500		28.8-29.0	290-9136-00
16027.500		28.9-29.1	290-9146-00
16077.500		29.0-29.2	290-9137-00
16127.500		29.1-29.3	290-9147-00
16177.500		29.2-29.4	290-9138-00
16227.500		29.3-29.5	290-9148-00
16277.500		29.4-29.6	290-9139-00
16327.500		29.5-29.7	290-9149-00
16377.500		29.6-29.8	290-9140-00
16477.500		29.8-30.0	290-9141-00

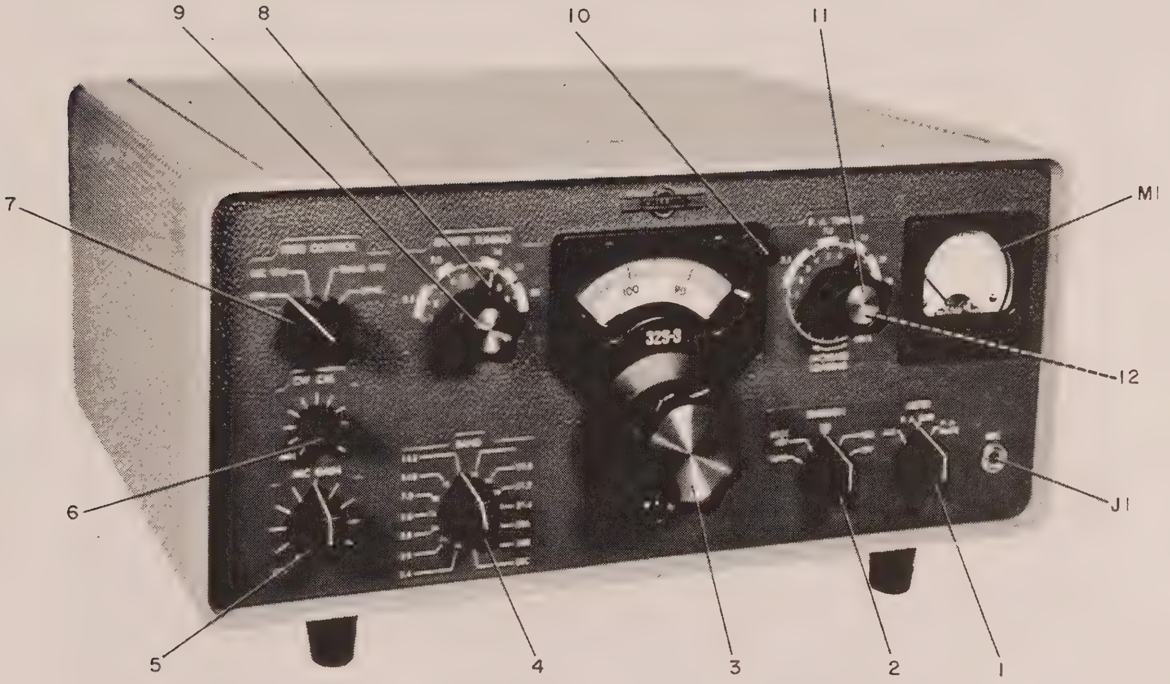


Figure 6-1. Location of Knobs

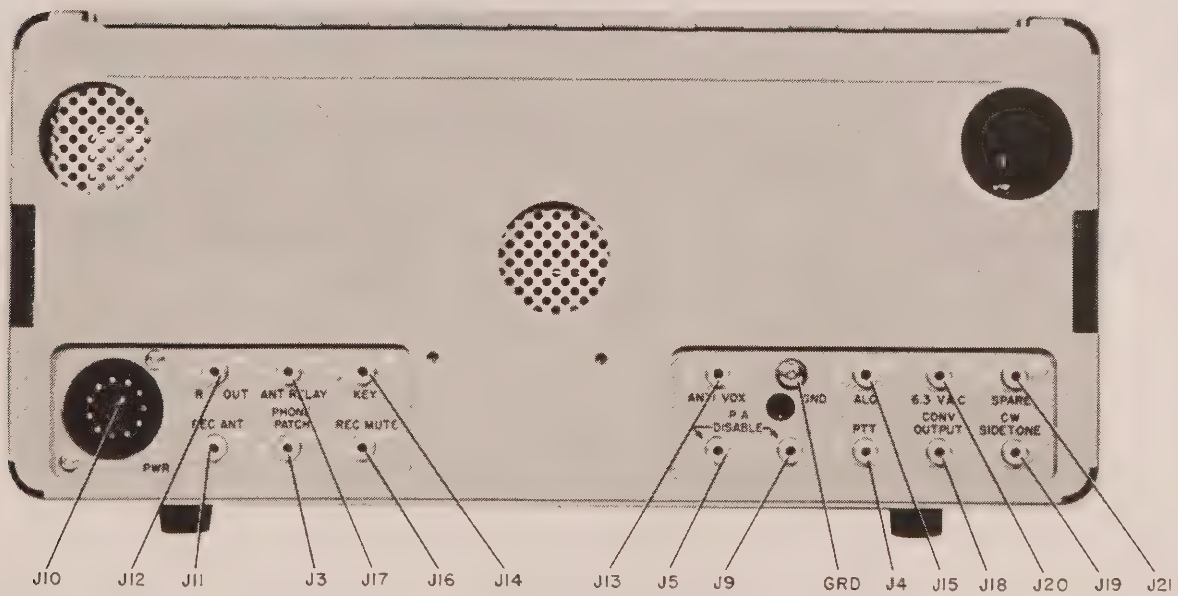


Figure 6-2. Location of Jacks

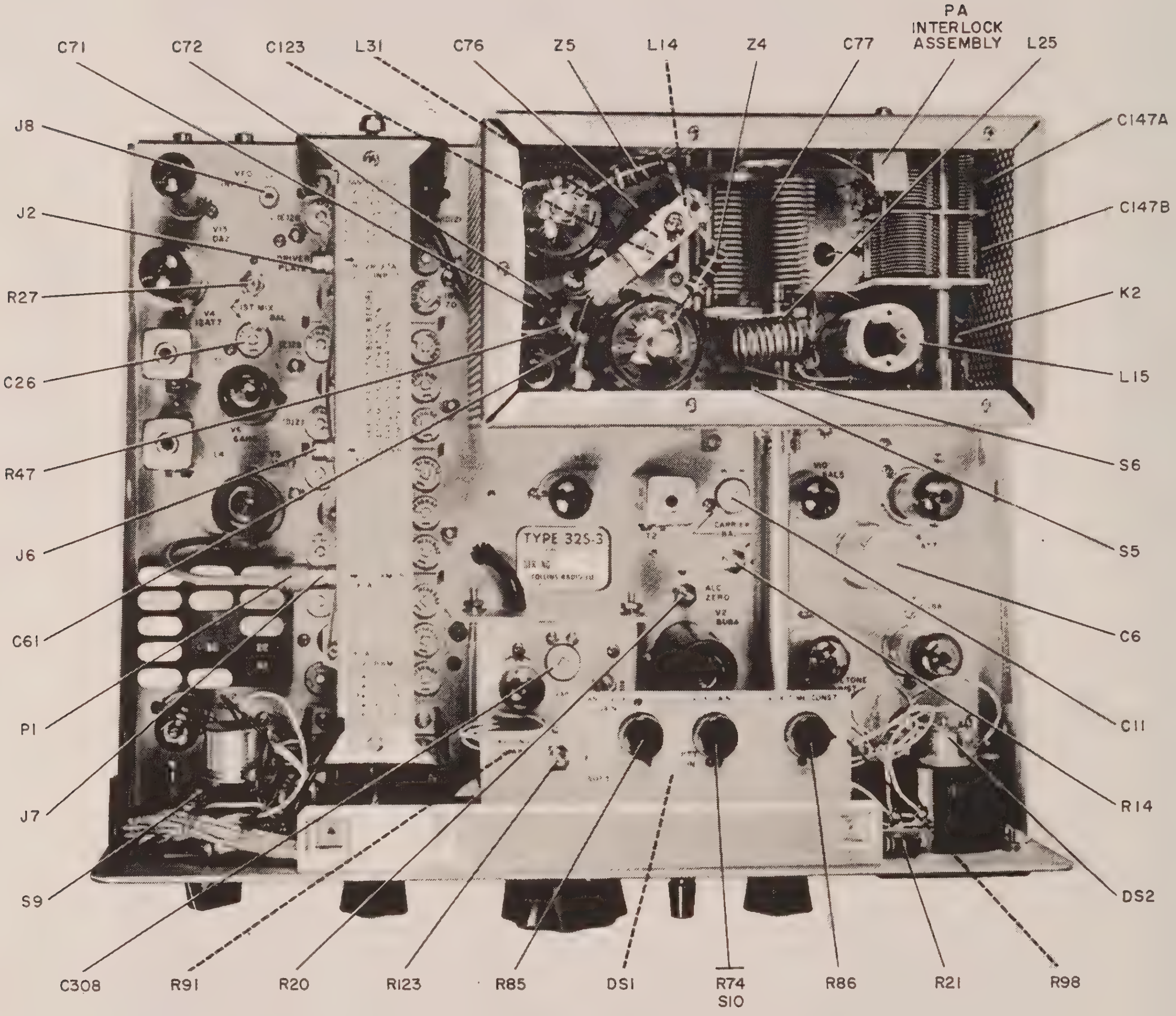


Figure 6-3. Top Chassis Parts Location

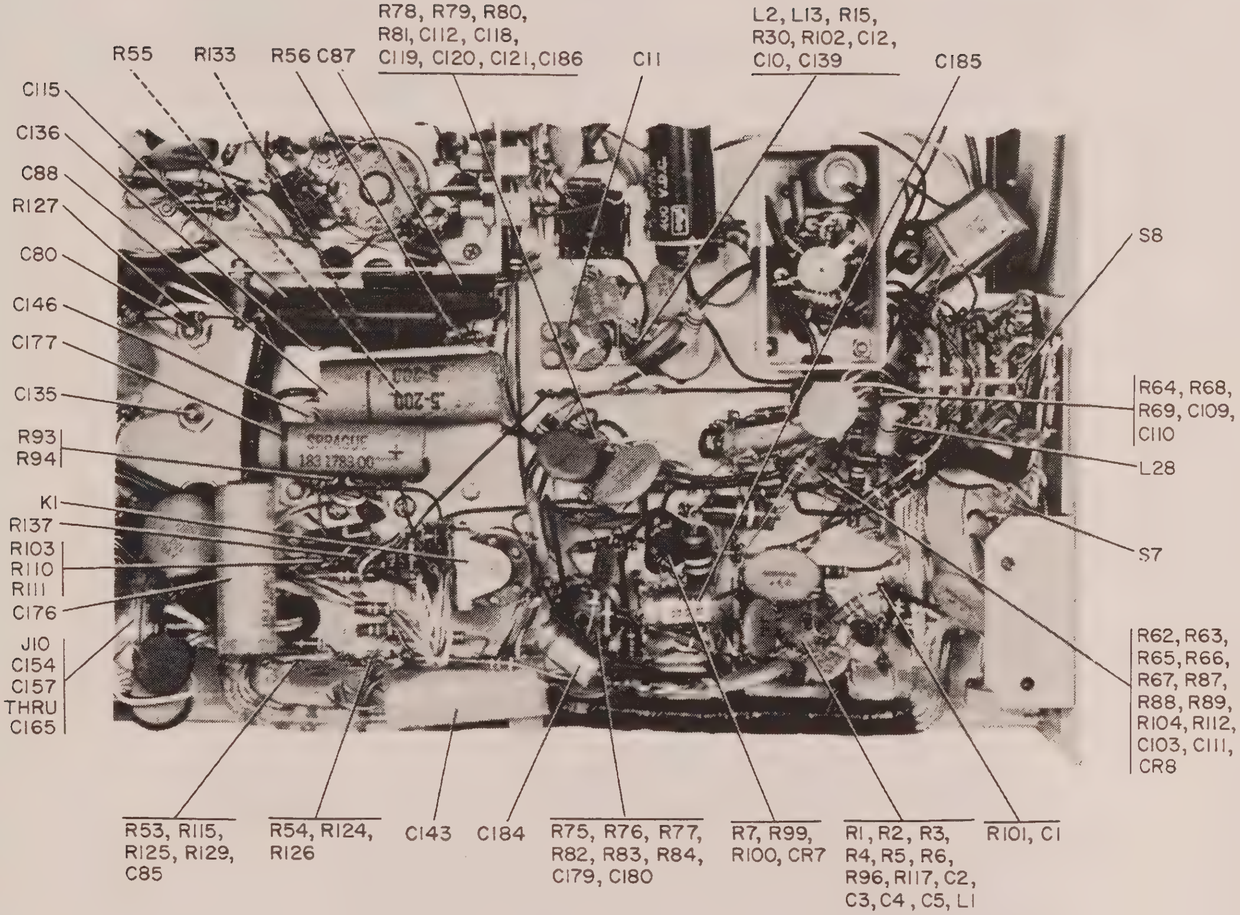

R55
R133
R56 C87
R78, R79, R80, R81, C112, C118, C119, C120, C121, C186
C11
L2, L13, R15, R30, R102, C12, C10, C139
C185
C115
C136
C88
R127
C80
C146
C177
C135
R93
R94
K1
R137
R103
R110
R111
C176
J10
C154
C157
THRU
C165
S8
R64, R68, R69, C109, C110
L28
S7
R62, R63, R65, R66, R67, R87, R88, R89, R104, R112, C103, C111, CR8
R53, R115, R125, R129, C85
R54, R124, R126
C143
C184
R75, R76, R77, R82, R83, R84, C179, C180
R7, R99, R100, CR7
R1, R2, R3, R4, R5, R6, R96, R117, C2, C3, C4, C5, L1
R101, C1

Figure 6-4. Under Chassis Parts Location, Left Side

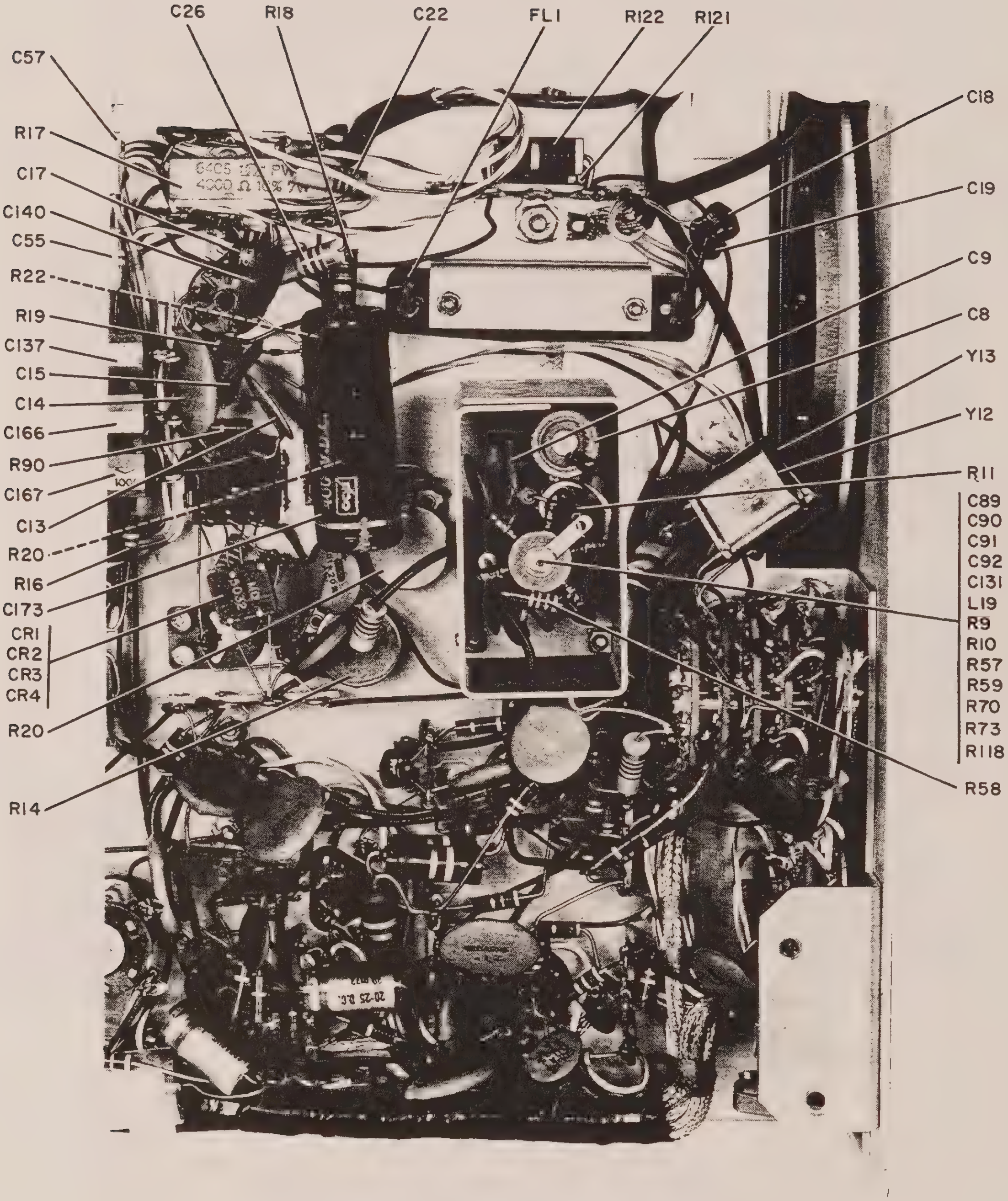


Figure 6-5. Under Chassis Parts Location, Center Front

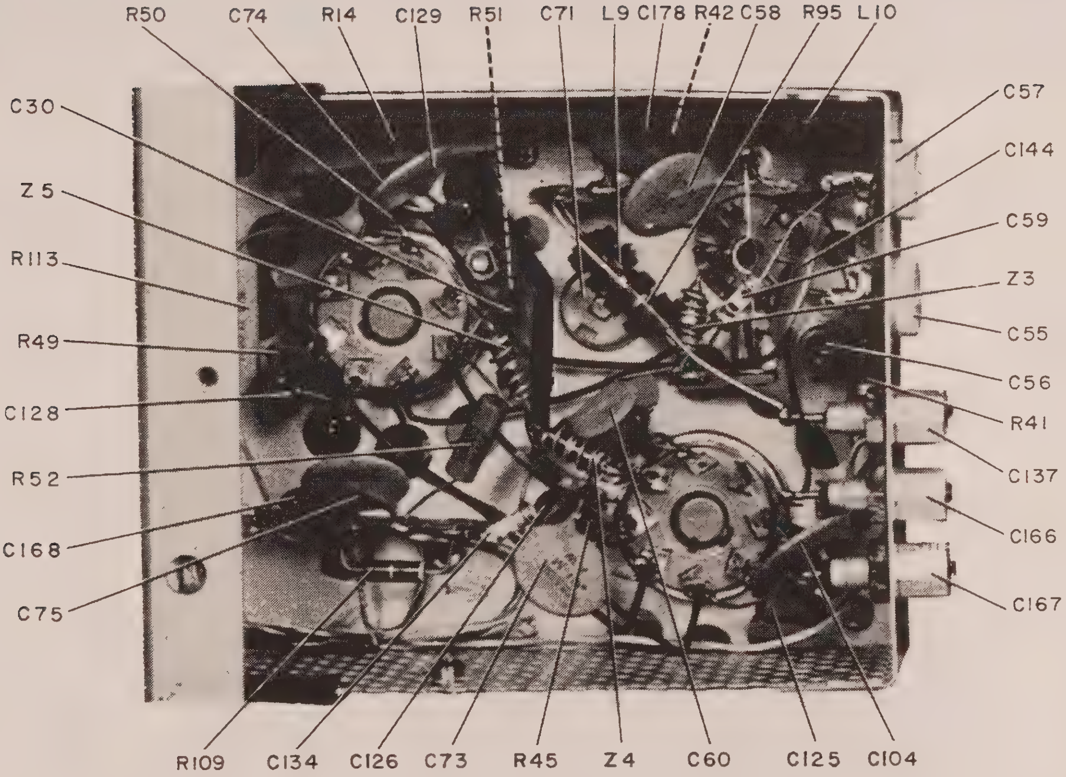


Figure 6-6. PA Grid Circuits Compartment, Parts Location

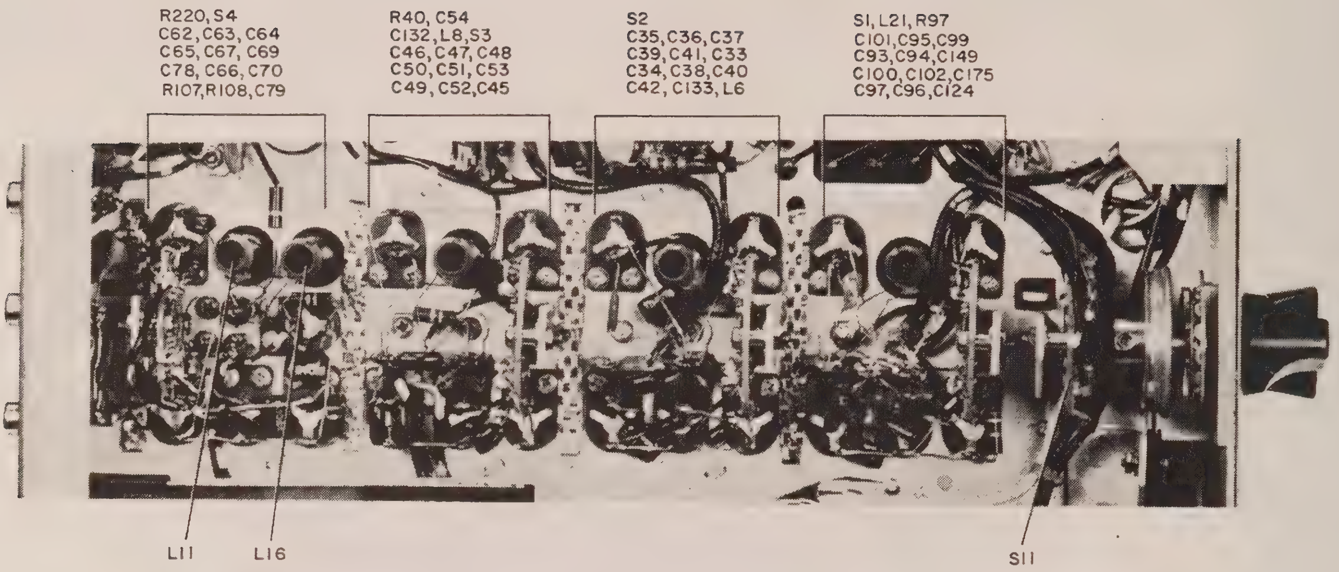


Figure 6-7. Band Switch Section, Parts Location

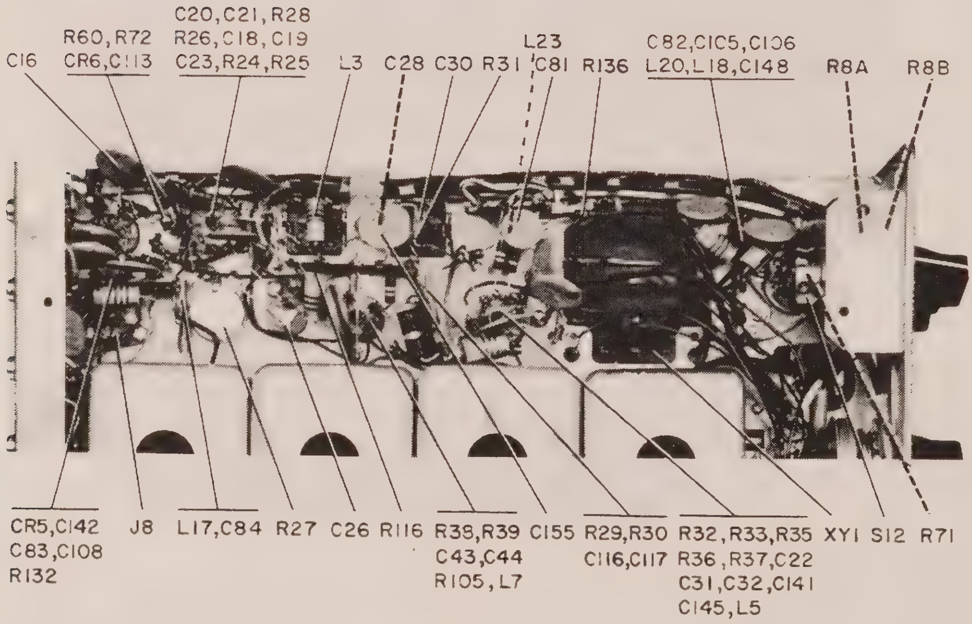
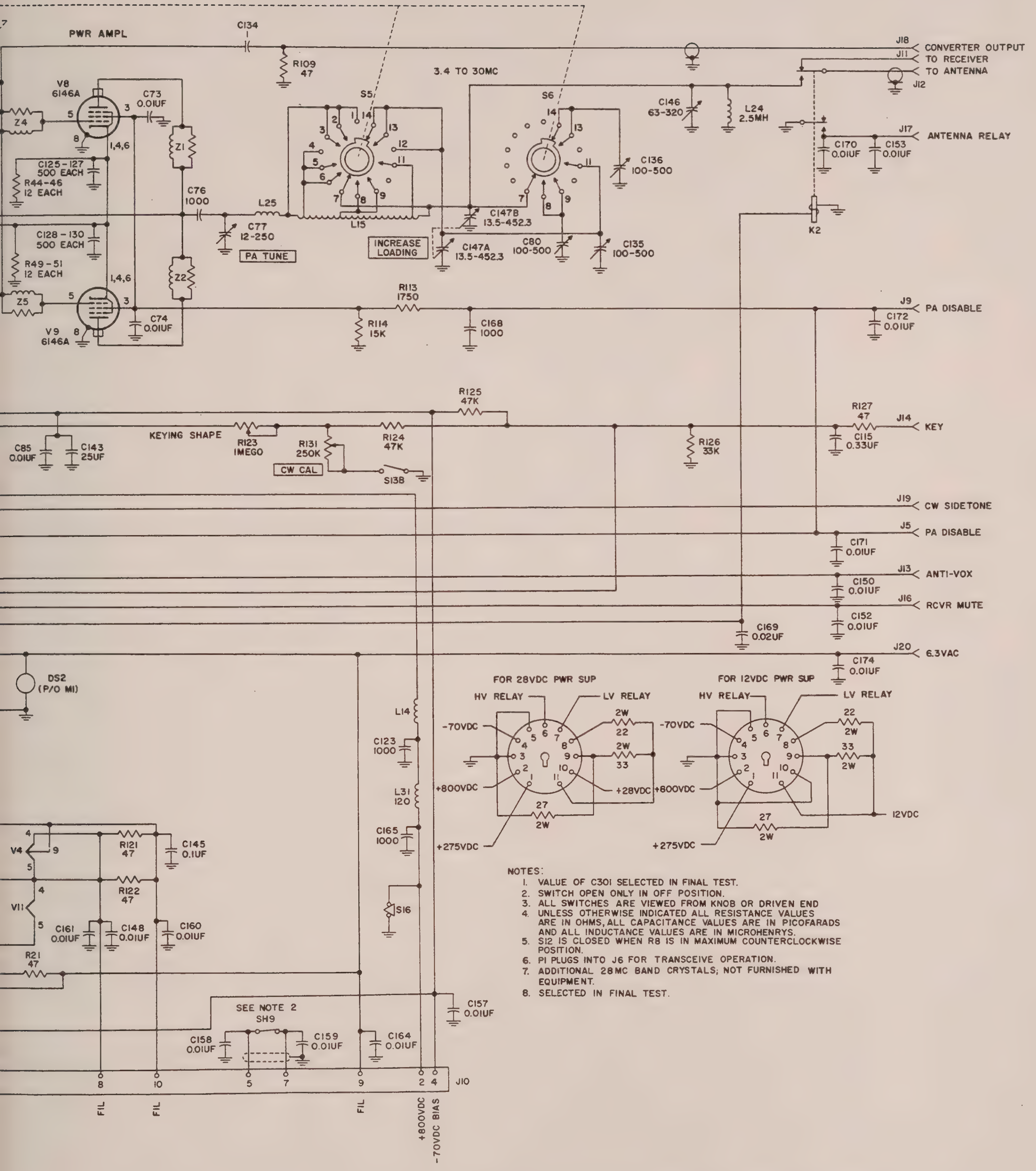


Figure 6-8. Under Chassis Parts Location, Right Side

section 7

illustrations



NOTES:

1. VALUE OF C301 SELECTED IN FINAL TEST.
2. SWITCH OPEN ONLY IN OFF POSITION.
3. ALL SWITCHES ARE VIEWED FROM KNOB OR DRIVEN END
4. UNLESS OTHERWISE INDICATED ALL RESISTANCE VALUES ARE IN OHMS, ALL CAPACITANCE VALUES ARE IN PICOFARADS AND ALL INDUCTANCE VALUES ARE IN MICROHENRYS.
5. S12 IS CLOSED WHEN R8 IS IN MAXIMUM COUNTERCLOCKWISE POSITION.
6. P1 PLUGS INTO J6 FOR TRANSCEIVE OPERATION.
7. ADDITIONAL 28MC BAND CRYSTALS; NOT FURNISHED WITH EQUIPMENT.
8. SELECTED IN FINAL TEST.

Figure 7-1. 32S-3 Transmitter, Schematic Diagram

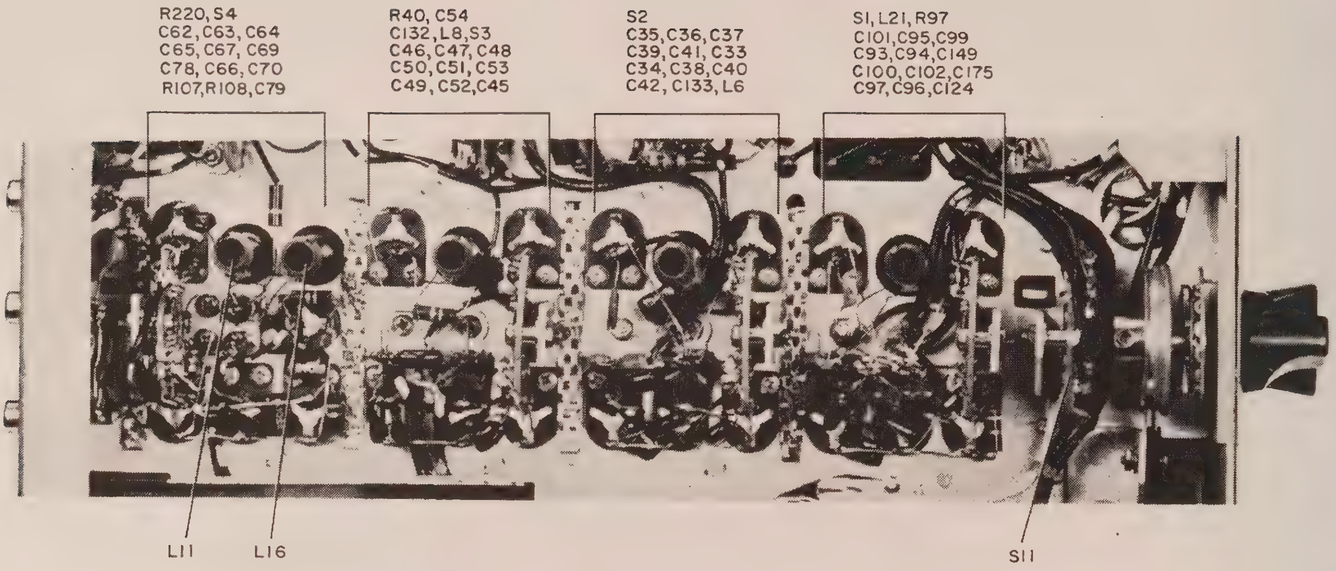


Figure 6-7. Band Switch Section, Parts Location

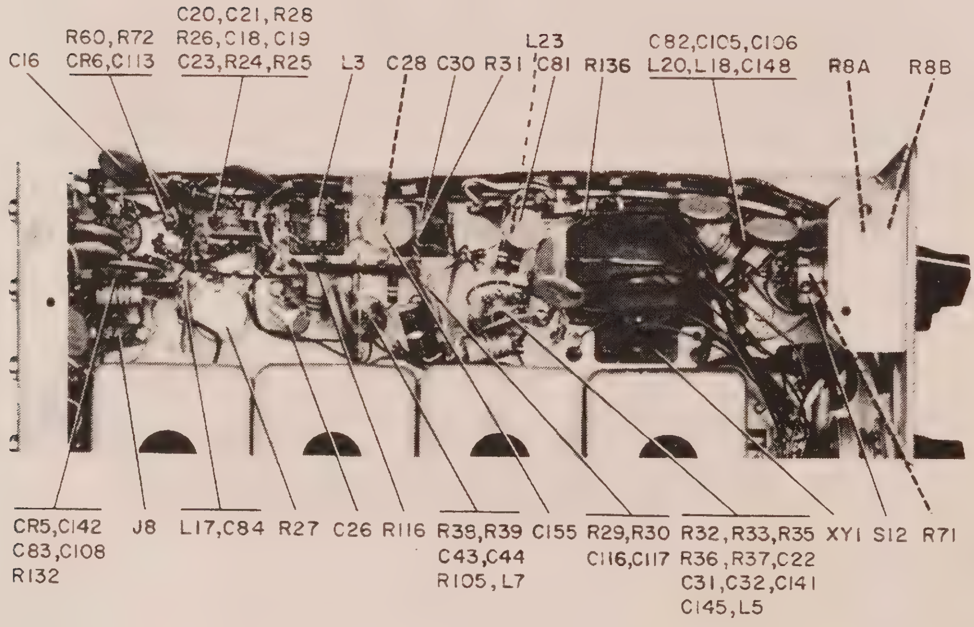
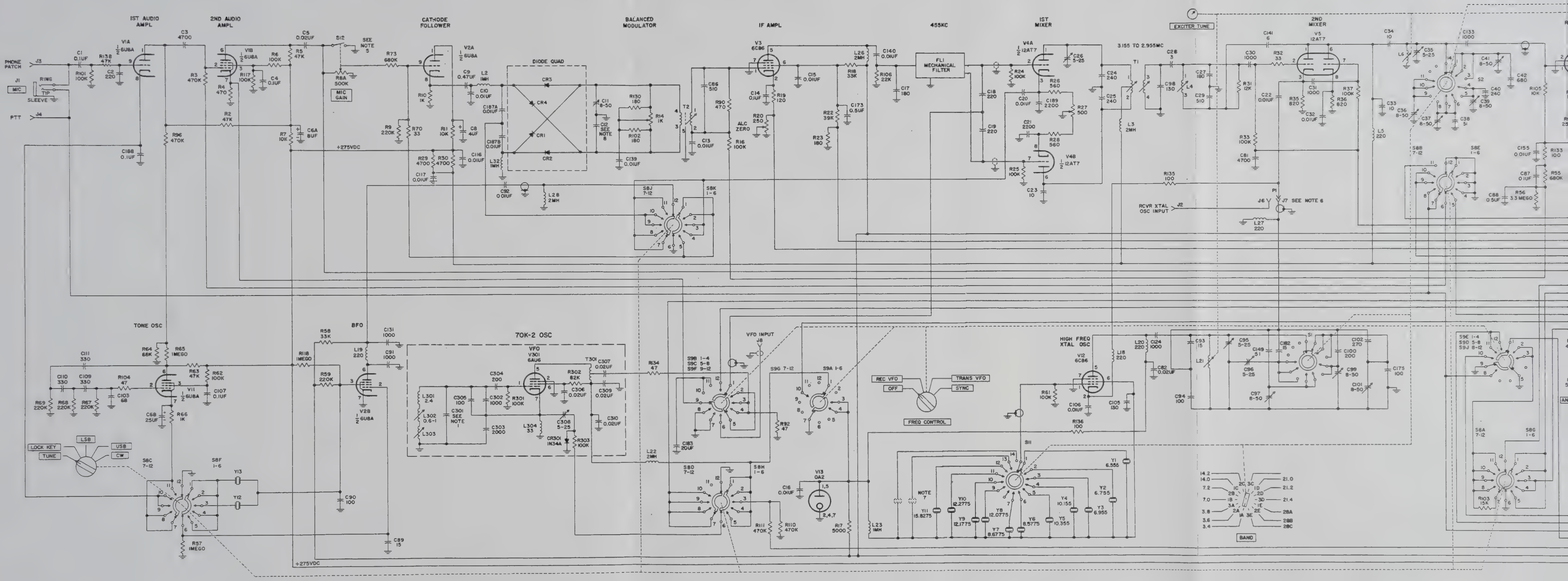
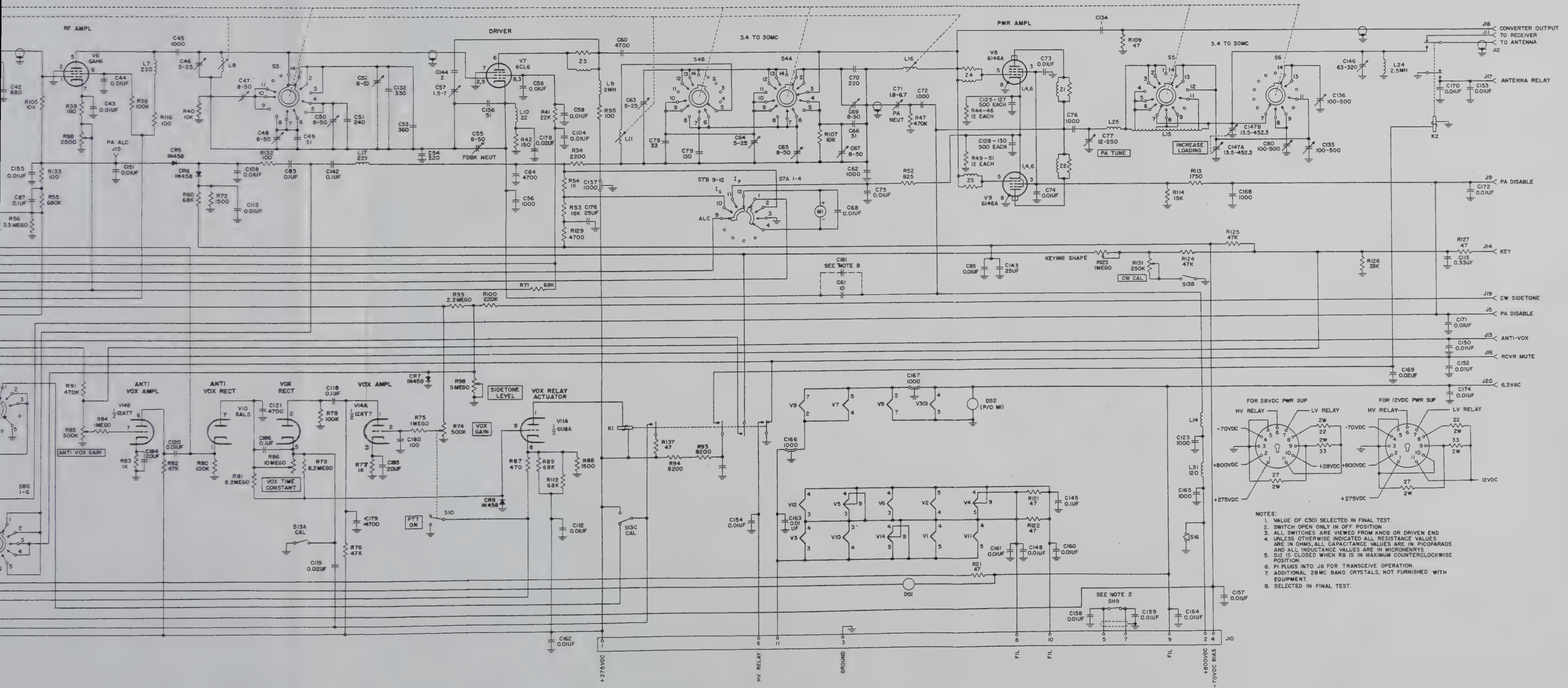


Figure 6-8. Under Chassis Parts Location, Right Side


1ST AUDIO AMPL
2ND AUDIO AMPL
CATHODE FOLLOWER
BALANCED MODULATOR
IF AMPL
455KC
1ST MIXER
EXCITER TUNE
2ND MIXER
PHONE PATCH
J3
J1
MIC
RING
TIP
SLEEVE
PTT
J4
V1A ½ 6U8A
V1B ½ 6U8A
V2A ½ 6U8A
DIODE QUAD
CR1
CR2
CR3
CR4
V3 6CB6
FL1 MECHANICAL FILTER
V4A ½ 12AT7
V4B ½ 12AT7
V5 12AT7
3.155 TO 2.955MC
T1
T2
MIC GAIN
R8A 500K
S12
SEE NOTE 5
+275VDC
ALC ZERO
S8J 7-12
S8K 1-6
RCVR XTAL OSC INPUT
J2
J6
J7 SEE NOTE 6
P1
S8B 7-12
S8E 1-6
TONE OSC
V11 ½ 6U8A
BFO
V2B ½ 6U8A
70K-2 OSC
VFO V301 6AU6
T301
CR301 1N34A
VFO INPUT J8
S9B 1-4
S9C 5-8
S9F 9-12
S9G 7-12
S9A 1-6
REC VFO
OFF
TRANS VFO
SYNC
FREQ CONTROL
HIGH FREQ XTAL OSC
V12 6CB6
S11
S1
V13 OA2
LOCK KEY
TUNE
LSB
USB
CW
S8C 7-12
S8F 1-6
Y13
Y12
S8D 7-12
S8H 1-6
Y1 6.555
Y2 6.755
Y3 6.955
Y4 10.155
Y5 10.355
Y6 8.5775
Y7 8.6775
Y8 12.0775
Y9 12.1775
Y10 12.2775
Y11 15.8275
NOTE 7
BAND
14.2
14.0
7.2
7.0
3.8
3.6
3.4
21.0
21.2
21.4
28A
28B
28C
S9E 1-4
S9D 5-8
S9J 8-12
S8A 7-12
S8G 1-6
R103 15K



NOTES:
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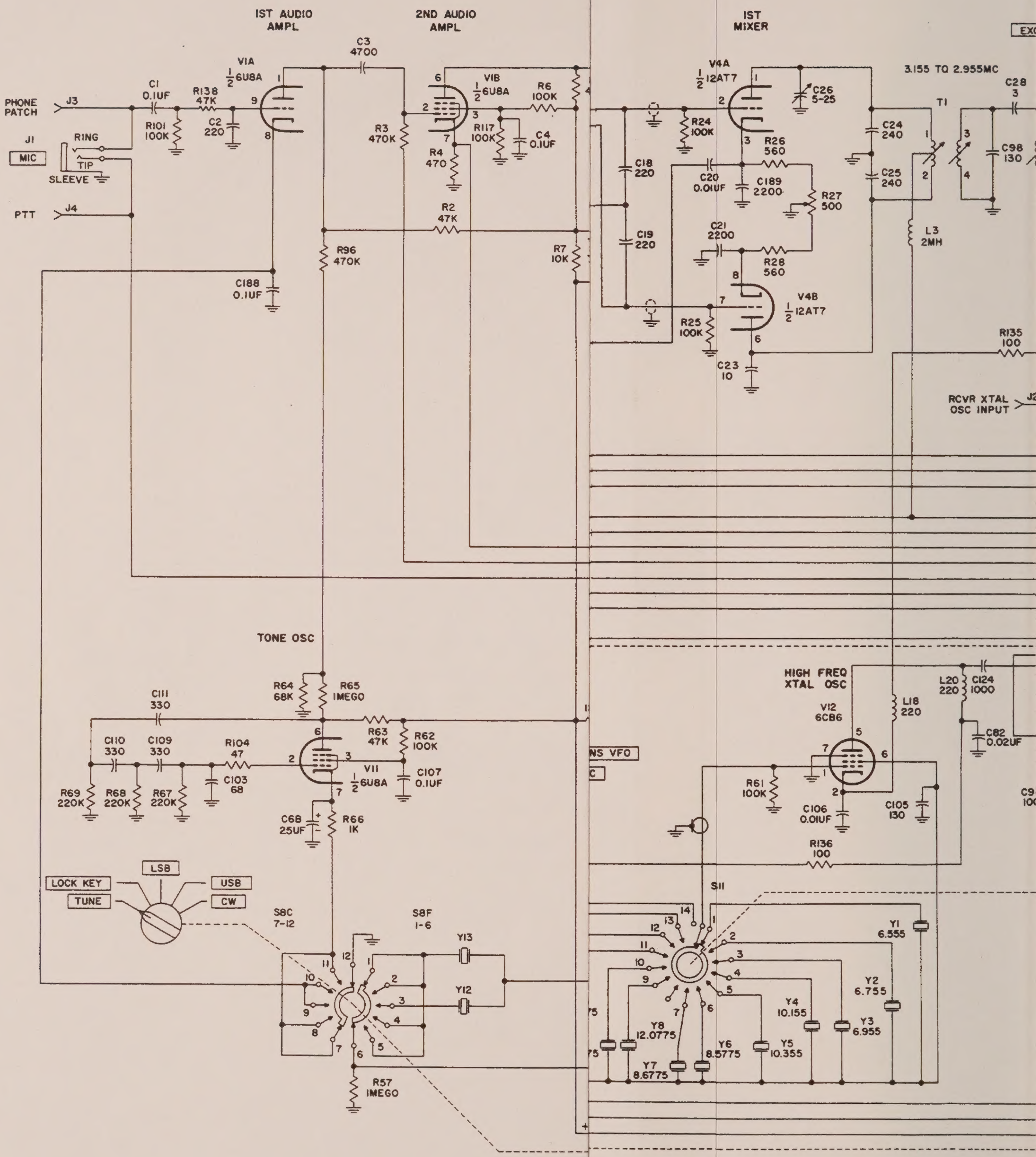
8. SELECTED IN FINAL TEST.

Figure 7-1. 32S-3 Transmitter, Schematic Diagram


1ST AUDIO AMPL
2ND AUDIO AMPL
1ST MIXER
EXC
3.155 TO 2.955MC
PHONE PATCH
J3
J1
MIC
RING
TIP
SLEEVE
PTT
J4
C1 0.1UF
R138 47K
R101 100K
C2 220
V1A 1/2 6U8A
C3 4700
V1B 1/2 6U8A
R3 470K
R4 470
R117 100K
C4 0.1UF
R6 100K
R2 47K
R96 470K
R7 10K
C188 0.1UF
V4A 1/2 12AT7
C26 5-25
R24 100K
R26 560
C18 220
C19 220
C20 0.01UF
C189 2200
R27 500
C21 2200
R28 560
V4B 1/2 12AT7
R25 100K
C23 10
C24 240
C25 240
T1
C28 3
C98 130
L3 2MH
R135 100
RCVR XTAL OSC INPUT
J2
TONE OSC
R64 68K
R65 1MEGO
C111 330
C110 330
C109 330
R104 47
R63 47K
R62 100K
V11 1/2 6U8A
C107 0.1UF
C103 68
R69 220K
R68 220K
R67 220K
C68 25UF
R66 1K
NS VFO
C
HIGH FREQ XTAL OSC
V12 6CB6
L18 220
L20 220
C124 1000
C82 0.02UF
R61 100K
C106 0.01UF
C105 130
R136 100
C9
10
LSB
LOCK KEY
USB
TUNE
CW
S8C 7-12
S8F 1-6
Y13
Y12
R57 1MEGO
S11
Y1 6.555
Y2 6.755
Y3 6.955
Y4 10.155
Y5 10.355
Y6 8.5775
Y7 8.6775
Y8 12.0775
75
75

COLLINS